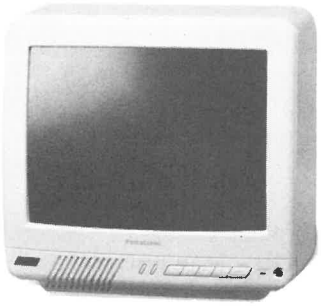
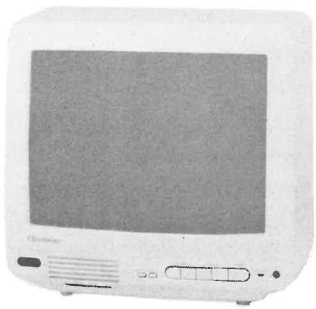
ORDER NO. MTC9404559F1
PQ1

Service Manual

Color Television



CT–10R11S & CT–10R11CS



TP1016K

Panasonic Models	Chassis
CT–10R11S	**ASDP215**
CT–10R11CS	**YASDP215**

Quasar Model	Chassis
TP1016K	**ASDC215**

Main Manual
(NA1)

1624

Specifications

Power Source:	120 volts, 60 Hz, AC
Power Consumption:	1.0 amp max.
Antenna Terminal Impedance:	1–UHF/VHF 75Ω input
Channel Capability:	155 Channels (Phase 14 Modified Synthesizer)
Off the Air:	VHF 2~13, UHF 14~69
Cable:	99 Channels
Sound Output:	1.25W (10% distortion)
Earphone Jack:	1/8" Jack (Cabinet front)
Remote Control:	Infra–red system EUR641231 (Panasonic) EUR641232 (Quasar)
Picture Tube:	10" diagonal Viewing area 90 degree deflection A26JGZ91X
Anode Voltage:	23.75kV max. (zero beam) 22.5kV ±1.25kV
Dimensions:	Height – 10.6" (269mm) Width – 10.3" (262mm) Depth – 13.0" (330mm)
Weight:	15.5 lbs. (7.0kg)

Specifications are subject to change without notice or obligation.
Dimensions and weight are approximate measurements.

The service technician is required to read and follow the "Safety Precautions" and "Important Safety Notice" in this manual.

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Important Safety Notice

There are special components used in this television set which are important for safety. These parts are [BOXED] on the schematic diagram and printed in **BOLD TYPE** on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent X–RADIATION, shock, fire or other hazards. Do not modify the original design without the permission of manufacturer.

Safety Precautions

General Guidelines

An ISOLATION TRANSFORMER should always be used during the servicing of a Receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the Receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

When servicing observe the original lead dress, especially in the high voltage circuit. In case of a short circuit, replace every part which has overheated.

Always REPLACE PROTECTIVE DEVICES, such as fishpaper, isolation resistors and capacitors and shields after working on the Receiver. Use only manufacturers recommended rating for fuses, circuit breakers, etc.

High potentials are present when this set is operating. Operation of the set without the rear cover involves the danger of electric shock from the set's power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high–voltage equipment.

Extreme care should be used in HANDLING THE PICTURE TUBE. Rough handling may cause it to implode due to atmospheric pressure (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure in removal or installation. When handling, use safety goggles and heavy gloves for protection. Discharge picture tube by shorting the anode connection to chassis ground (not cabinet or other mounting parts). When discharging, go from cold ground (i.e. dag ground lead) to anode with a well insulated piece of wire.

Avoid prolonged exposure at close range to unshielded areas of the picture tube. Possible danger of personal injury from unnecessary exposure to X–ray radiation may result.

The TEST PICTURE TUBE used for servicing the chassis at the bench should incorporate a safety glass and magnetic shield. The safety glass affords shielding from the tube viewing area against X–ray radiation as well as implosion protection. The magnetic shield limits X–ray radiation around the bell of the picture tube in addition to restricting magnetic effects. When using a picture tube test jig for service, ensure that jig is capable of handling 31kV without causing X–radiation.

BEFORE RETURNING A SERVICED RECEIVER **(of any type)** TO THE OWNER, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock. DO NOT USE A LINE ISOLATION TRANSFORMER WHEN MAKING THIS TEST.

Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs.

Measure the resistance between the jumpered AC plug and each exposed metallic part such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. When the exposed metal does not have a return path to the chassis, the reading must be infinite.

Leakage Current Hot Check (See Figure)

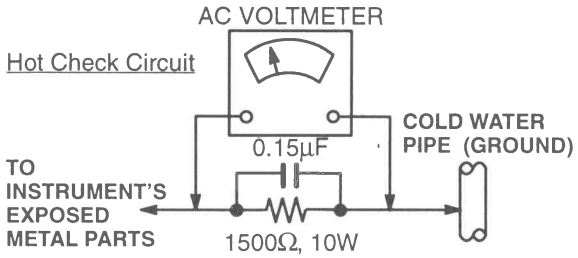
Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15μF capacitor between each exposed metallic part and ground. Use an earth ground, for example a water pipe.

Using an AC voltmeter with 1000 ohms/volt or more sensitivity, measure the potential across the resistor.

Move the resistor connection to each exposed metallic part and measure the voltage present.

Check that any potential does not exceed 0.75 volt RMS. A leakage current tester (Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above hot check, in which case any current measure must not exceed 1/2 milliamp. In case any measurement is out of the limits specified, there is a possibility of a shock hazard and the set must be repaired and rechecked before it is returned to the customer.



X–Radiation

WARNING: The potential source of X–radiation in TV sets is the High Voltage section and the picture tube.

NOTE: It is important to use an accurate, periodically calibrated high voltage meter.

Adjust BRIGHTNESS, PICTURE, SHARPNESS and COLOR controls to Minimum.

Measure the High Voltage. The high voltage meter should indicate 22.5kV (±1.25kV). If the upper meter indication is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Horizontal Osc. Disable Circuit Test

This test must be made as a final check before the set is returned to the customer. See HORIZONTAL OSC. DISABLE CIRCUIT PROCEDURE CHECK in this manual.

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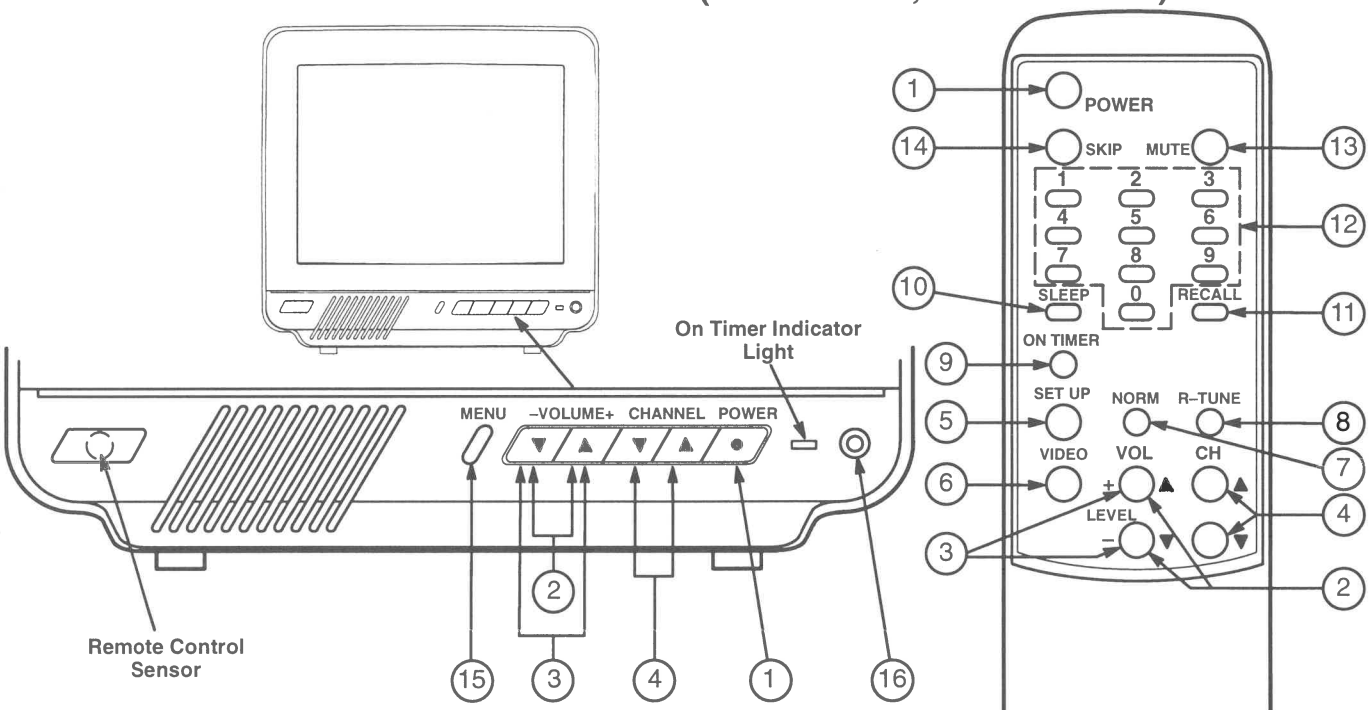
Followed by 1 Large Separate Pullout Schematic Sheet Containing All Schematics, Waveforms, Notes, Voltage Charts & Remaining Printed Wiring Boards.

Location of Controls (CT–10R11S, CT–10R11CS)



Remote Control

Quick Reference Control Operation

(1) **Power Button** – Press to turn ON. Press again to turn OFF.

(2) **Volume (Vol) Buttons** – Press the VOLUME (VOL) ▲ button to increase sound level. Press the VOLUME (VOL) ▼ button to decrease sound level.

(3) **Level (+) and (–) Buttons** – Press to adjust Video, Set Up and On Timer Menus, when displayed.

(4) **Channel (Ch) Buttons** – Press the CHANNEL (CH) ▲ button to select the next higher programmed channel. Press the CHANNEL (CH) ▼ button to select the next lower programmed channel.

(5) **Set Up Button** – Press the SET UP button to display Set Up Menus:
- Initiate Auto Channel Programming
- Program Channel Memory
- Select TV/ANT or Cable Tuning System
- Set Clock

(6) **Video Button** – Press the VIDEO button to display Video Adjustment Menus. Use to adjust Color, Tint, Brightness, Picture and Sharpness.

(7) **Norm (Normalize) Button** – Press the NORM (NORMALIZE) button while any Video Adjustment Menu is displayed. Adjustments will automatically set to a factory preset level.

(8) **R–Tune (Rapid Tune) Button** – Press to alternately switch between the last two channels selected.

(9) **On Timer Button** – Press to display On Timer Menu. This feature allows turn ON at a predetermined time and channel.

(10) **Sleep Button** – Press the SLEEP button to select automatic turn OFF in 30, 60 or 90 minutes.

(11) **Recall Button** – Press the RECALL button to display:
- Time of Day (if clock is set) or status of Sleep Timer
- Channel Number

(12) **Channel Keyboard "0 through 9" Buttons** – Press desired channel number to access any programmed or unprogrammed channel.

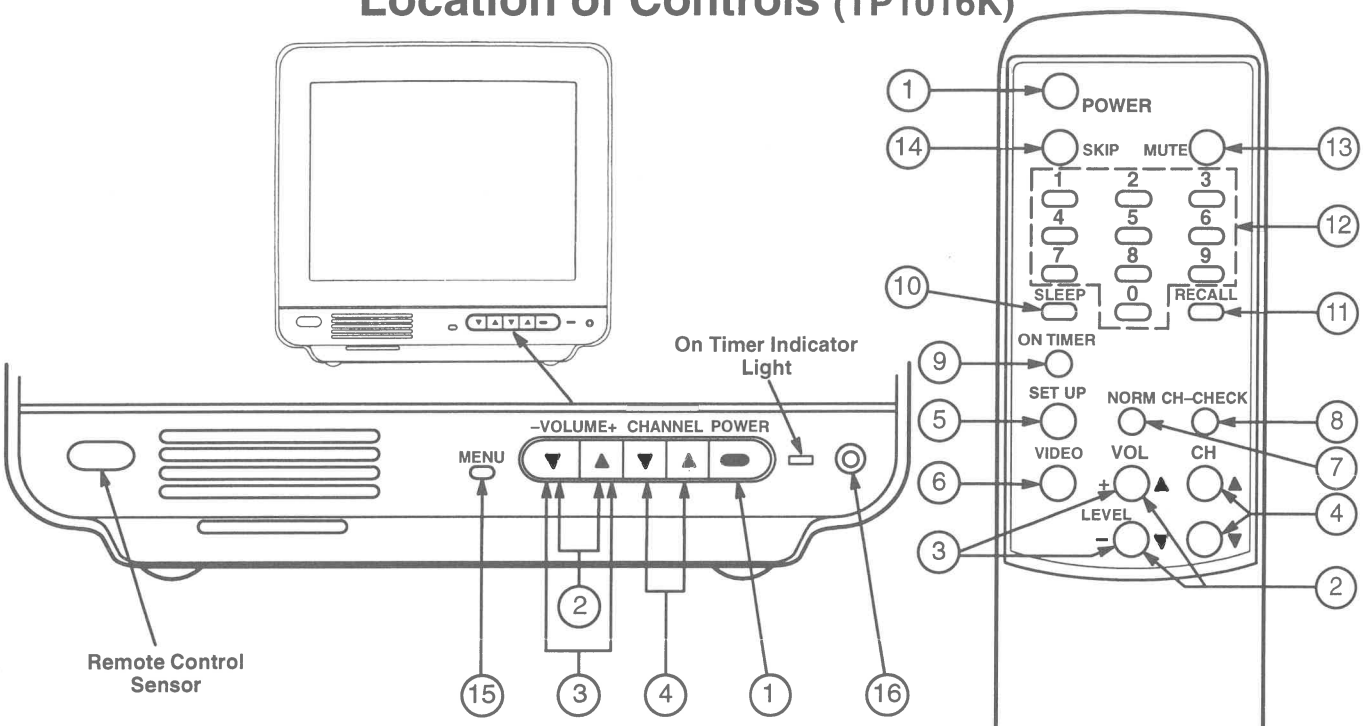
(13) **Mute Button** – Press the MUTE button to mute sound. A second press will return sound to its previous level.

(14) **Skip Button** – Press the SKIP button to choose 30, 60 or 90 seconds, then select any other channel(s). When the time elapses you will automatically return to the original channel.

(15) **Menu Button** – Press the MENU button to access both Video and Set Up Menus.

(16) **Earphone Jack** – Plug in an optional earphone for private monitoring of sound.

Location of Controls (TP1016K)



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- Initiate Auto Channel Programming
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- Select TV/ANT or Cable Tuning System
- Set Clock

(6) **Video Button –** Press the VIDEO button to display Video Adjustment Menus. Use to adjust Color, Tint, Brightness, Picture and Sharpness.

(7) **Norm (Normalize) Button –** Press the NORM (NORMALIZE) button while any Video Adjustment Menu is displayed. Adjustments will automatically set to a factory preset level.

(8) **Ch–Check (Channel Check) Button –** Press to alternately switch between the last two channels selected.

(9) **On Timer Button –** Press to display On Timer Menu. This feature allows turn ON at a predetermined time and channel.

(10) **Sleep Button –** Press the SLEEP button to select automatic turn OFF in 30, 60 or 90 minutes.

(11) **Recall Button –** Press the RECALL button to display:
- Time of Day (if clock is set) or status of Sleep Timer
- Channel Number

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(15) **Menu Button –** Press the MENU button to access both Video and Set Up Menus.

(16) **Earphone Jack –** Plug in an optional earphone for private monitoring of sound.

Disassembly For Service

Back Cover

1. Remove all 5 screws on back of set and slowly remove back.

A–Board – Main Chassis

1. Place set on side (soft clean surface) and slide chassis completely out.
   NOTE: Some tie–wraps securing wire dressings may have to be unfastened for chassis removal.

C–Board – CRT Output

1. Plugs into socket on CRT neck.

R–Board – Remote Receiver

1. Secured to cabinet by 1 screw.

L–Board – LED Indicator/Earphone Jack

1. Secured to cabinet front by 1 screw.

Y–Board – Sub Tint

1. Affixed to A–Board by solder connections A1 and A2.

Disassembly for CRT Replacement

1. Discharge CRT as instructed in Safety Precautions.
2. Disconnect yoke plug, degaussing coil plug, speaker plug (SP), Remote Receiver (A8) and L–Board (A32), from Main Board and CRT 2nd anode button.
3. Remove C–Board from CRT base and unplug black wire (CRT dag ground) from board.
4. Slide Main chassis assembly completely out. Remove with CRT Board.

CRT Replacement

1. Perform DISASSEMBLY FOR CRT REPLACEMENT procedure.
2. Insure CRT H.V. anode button is discharged before handling CRT. See SAFETY PRECAUTIONS on handling the picture tube.
3. Remove components on CRT neck and place cabinet face down on a soft pad.
4. Remove CRT mounting screws from each corner and remove CRT with dag ground braid attached.
5. Note original mounting of dag ground assembly to insure proper re–installation on the replacement CRT.
6. Remove dag ground braid from CRT.
7. Mount dag ground braid on replacement CRT. Mount replacement CRT in cabinet.

Service Notes

IMPORTANT: To protect against possible damage to solid state devices due to arcing or static discharge, make certain all ground wires and CRT DAG wire are securely connected.

CAUTION: The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing to avoid damage to test equipment or chassis. Connect test equipment to correct ground (⏚) or (⏚) when servicing or incorrect readings will occur.

WARNING: This Receiver has been designed to meet or exceed applicable safety and X–radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X–radiation and shock and fire hazard, the parts shown in the BOXED areas of the schematic must be replaced with identical replacement parts. Order parts from the manufacturer's parts center using numbers shown in this service manual or give complete chassis number and part reference number.

For optimum performance and reliability, all other parts should be replaced with components having identical specifications.

Horiz Osc Disable Circuit

This chassis employs a special circuit to protect against excessive high voltage. If for any reason the high voltage exceeds a predetermined amount, this circuit operates and detunes the horizontal oscillator. This limits high voltage.

The over–voltage protection circuit is not adjustable. However, if components in the BOXED areas of the schematic in either the horizontal sweep system or the over–voltage protection circuit itself are changed the operation of the circuit should be checked using the following procedure.

Equipment needed to check disable circuit:

1. Accurate voltmeter (0 – 200V scale)
2. High Voltage Meter (0 – 40kV)
3. Variac and Isolation Transformer
4. Jumper wire

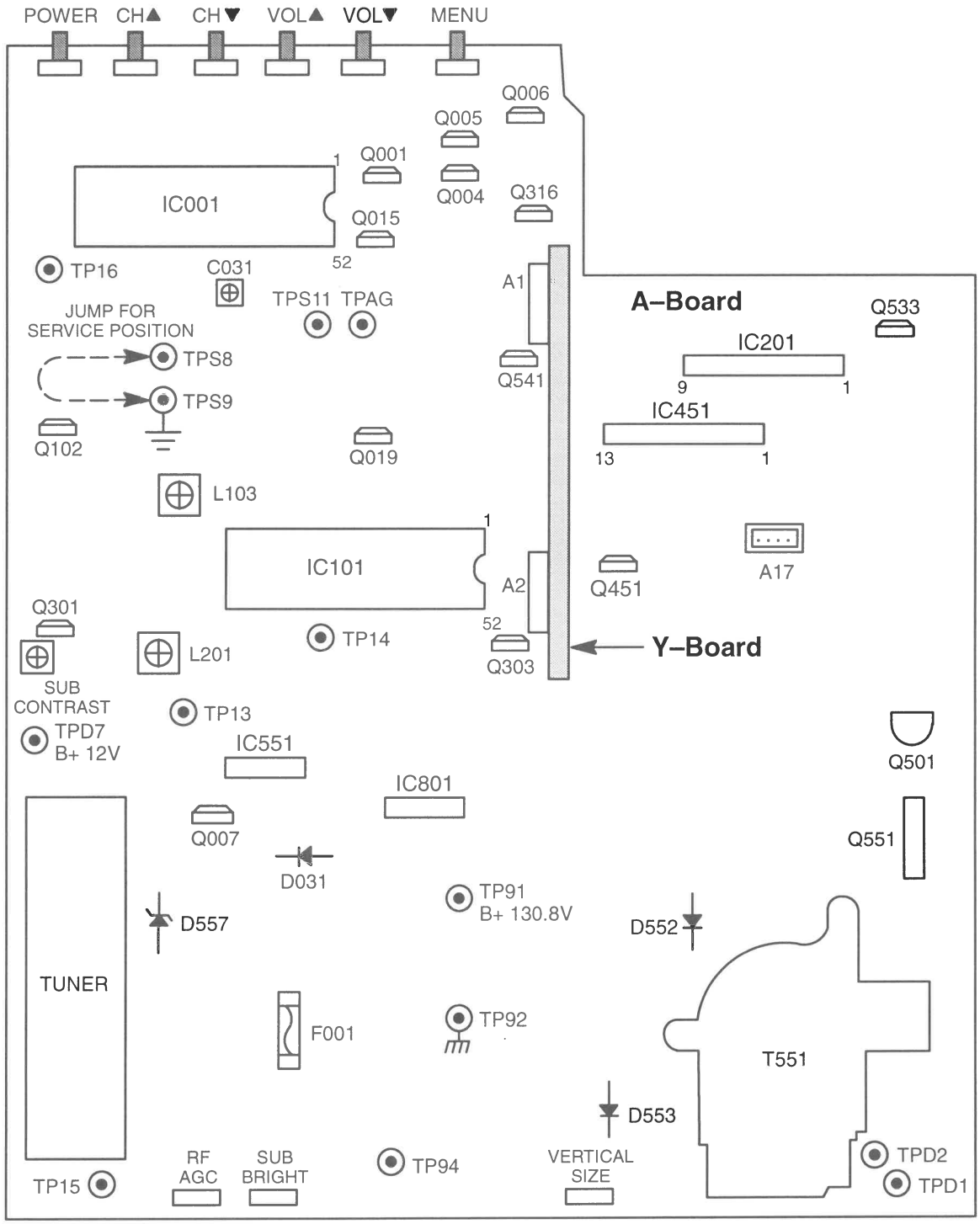
Procedure

1. Tune in a station to verify horizontal is in sync.
2. Obtain Monoscope pattern.
3. Connect voltmeter (+) to TPD1 and (–) to TPD2. Normalize VIDEO control menu. Adjust BRIGHTNESS to (0) and PICTURE for 0.9 volt reading on voltmeter.
4. Turn Receiver OFF. Connect jumper from TP91 to TP94.
5. Reduce AC supply voltage to approx. 90V. Connect high voltage meter to CRT 2nd anode (H.V. button). **NOTE:** Use dag ground for minus (–) lead connection of meter.
6. Turn Receiver ON. Slowly raise AC supply voltage and confirm that high voltage does not exceed 29kV when horizontal just begins to pull out of sync and sound mutes. If high voltage is not within the specified limit, the cause must be determined before the Receiver is returned to the customer. (SEE NEW CIRCUIT SECTION).

Service Adjustment Procedures

ALL SERVICE CONTROLS ARE FACTORY PRESET AND SHOULD NOT REQUIRE ADJUSTMENT UNLESS CONTROL AND/OR ASSOCIATED COMPONENTS ARE REPLACED.
NOTE: CONNECT MINUS LEAD OF VOLTMETER TO CORRECT GROUND FOR CIRCUIT BEING CHECKED. WHEN NECESSARY TO USE A LINE OPERATED GROUND, THE GROUND INDICATION (⏚) WILL BE INDICATED. FOR THIS GROUND, USE TP92. FOR ALL OTHER CIRCUITS, CONNECT MINUS LEAD OF VOLTMETER TO LINE ISOLATED GROUND (⏚) IC451 HEAT SINK OR CHASSIS GROUND.

Main Board Service Test Points



Top View

130.8V B+ Voltage Confirmation

1. Set BRIGHT, PICTURE and COLOR of Video Menu to Minimum.
2. Connect a DVM between TP91 and ground (⏚) TP92.
3. Confirm that B+ voltage is 130.8V ±1V. This voltage supplies B+ to Horizontal & Flyback circuits.

Source Voltage Chart

120V AC line input. BRIGHT and PICTURE of Video Menu to Minimum. Use isolated ground (⏚) for minus lead of DVM. These voltages are supplied by flyback transformer T551.

TPD7	+12.0V ±1V
TPD9 (No test pin)	+19V ±2V (IC551 pin 1)
TPD8 (No test pin)	+26.0V ±2V (D552 cathode)
TPD12 (No test pin)	+19V ±2V (D553 cathode)
Plug A17 (Pin 1)	+175V ±15V

+5V Source Voltage

Cathode D557 (Tuner BP)
Emitter Q004 (MPU, VDD ports, IC001 Function buttons)
Emitter Q005 (Remote Receiver)

+10V Standby B+

Cathode D031 (On–Off relay, Timer L.E.D., IC101 Pin 9, Horiz Osc, Q004 +5V regulator).

High Voltage Check

1. Select an active TV channel and confirm that horizontal is in sync.
2. Confirm B+ 130.8V is within limit.
3. Using a calibrated high voltage meter confirm that High Voltage is 22.5kV (±1.25kV).

RF AGC Delay R106

Adjust only if overloading on strong signal or busy background (snow) is present on moderate strength signals.

1. Adjust RF AGC control R106 until snow appears in picture, then adjust control until snow is eliminated.
2. Check all channels for optimum setting.

AFC Field Adjustment L103

1. Select TV/ANT mode.
2. Defeat AFC by applying jumper from TPS11 to ground (⏚).
3. Connect a digital voltmeter to AFC test point TP16. (Connect [–] lead to ground).
4. Check all active High Band channels 7~13 for AFC voltage range. Select channel with AFC voltage in approximate center of voltage range.
5. Adjust L103 for 4.5V (±0.5V) at TP16.
6. Remove jumper in Step 2. Check all active channels for proper AFC correction. Touch up L103 if required.

NOTE: Do not use CABLE channel with offset carriers for adjustment or in determination of low and high range of AFC voltage.

Sound Alignment L201

1. Select active TV channel.
2. Attenuate signal (loosely couple antenna lead or use RF attenuator pad) for noisy sound.
   - Adjust L201 for Maximum sound. Signal to noise ratio is best when L201 is peaked.
3. Connect antenna or remove RF attenuator for strong signal.

Sub–Brightness Control R318

Adjustment of this control is important for getting proper operation of brightness and picture controls. This adjustment must be made after Sub–Contrast or Color Temperature adjustments are made. **Do not adjust** SCREEN control after Sub–Brightness is set.

Preparation

Connect a color bar signal with 100 IRE white and 7.5 IRE black. Operate television for a minimum of 10 minutes prior to the adjustment.

Procedure

1. Normalize the Video Menu controls.
2. Adjust COLOR to Minimum.
3. Increase SUB–BRIGHTNESS control R318 so black bar starts to look grey. Then decrease SUB–BRIGHTNESS to the point where grey turns to black.
4. Adjust COLOR for normal viewing and check all active channels for good brightness level.

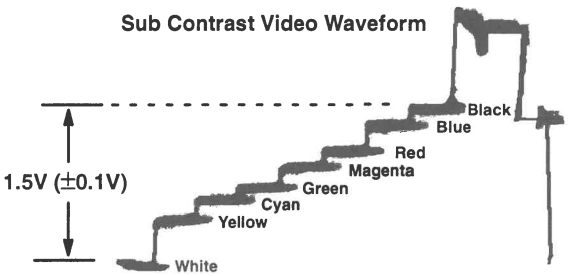
Sub Contrast R304

This adjustment is factory set. **Do not adjust** unless repairs are made to associated circuit, the CRT Board or the CRT is replaced.

Preparation

- Obtain a pattern with 87.5% modulation, 70% saturated color bar with a 100 IRE white and 7.5 black. **NOTE:** The pattern used in this procedure is an EIA color bar pattern with 87.5% modulation with 100 IRE white and 7.5 black. Correlate the information in this procedure to your pattern used.

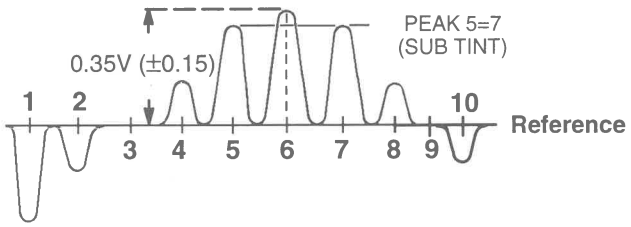
1. Connect signal (pattern as described above).
2. Connect oscilloscope to TP13. Set scope horizontal time base to 20µs (horizontal).
3. Connect a 4.7K ohm jumper from TPD7 to TPD1.
4. Set Video Menu controls to be Normalized.



5. Adjust SUB–CONTRAST control R304 for 1.5V (±0.1V) from white level to black level on video waveform (see video waveform detail).
6. Remove jumper (Step 3).

Color Adjustment R619

1. Apply rainbow color bar signal.
2. Set customer controls
   - Normalize Video Menu. Adjust BRIGHTNESS to Minimum (0). Adjust PICTURE until raster just appears dark.
   - Connect 4.7K resistor jumper between TPD7 (+12V) and TPD1.
3. Connect Oscilloscope to TP48B (C–Board).
4. Adjust SUB TINT R619 (Y–Board) so peak of color bar 6 is 0.35V (±0.15) above reference and peaks of color bars 5 and 7 are of the same magnitude as shown in detail.



Color Temperature Adjustment (B/W Tracking)

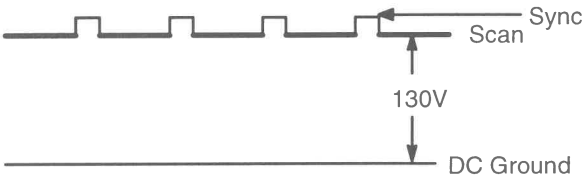
Minor Touch–Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for "good grey scale and warm highlights".

- LOW LIGHT areas – adjust LOW LIGHT controls (R354 and R355) for grey.
- HIGH LIGHT areas – adjust DRIVE controls (R357 and R358) for warm whites.

Complete Adjustment

1. Turn Receiver ON and allow 10 minutes warm up at high brightness.
2. Select active TV channel, B/W program if available.
3. Normalize the Video Menu controls.
4. Adjust COLOR to Minimum.
5. Adjust LOW LIGHTS (R354, R355) to Minimum.
6. Adjust HIGH LIGHTS (R357, R358) to Mid point.
7. Collapse vert to a horizontal line by applying jumper between TPS8 and ground (⏚) TPS9 and turn SCREEN control to Minimum (counterclockwise).
8. Connect scope to Green cathode (KG) and adjust SUB BRIGHT (R318) until voltage during scanning period is 130V DC as shown.



9. Increase SCREEN control (Clockwise) until a green horizontal line just appears.
10. With the two LOW LIGHT controls, adjust each to create a white horizontal line.
11. Remove jumper in Step 6.
12. Adjust BRIGHTNESS and PICTURE to Maximum and adjust highlights control (R357 and R358) controls for warm white.
13. Adjust BRIGHTNESS and PICTURE to low level brightness and recheck for low level grey scale. Adjust LOW LIGHTS if necessary.
14. Perform SUB–BRIGHTNESS adjustment.

Vertical Size R453

1. Turn the VERTICAL SIZE control R453 CCW until top and bottom edges of raster are visible.
2. Adjust the VERTICAL SIZE control CW until raster is approximately 10% overscan. Linearity adjustment is automatic with size adjustment.

Focus (Part of T551)

Adjust the FOCUS control to obtain the sharpest and clearest picture.

MPU Reference Oscillator C031

1. Connect frequency counter from TPS1 (IC001, pin 5) to ground (⏚).

NOTE: Frequency counter probe capacitance should be 8PF or less.

2. Select TV/ANT signal mode with the MENU button. Short TPS2 (IC001, Pin 7) to ground.
3. Select channel 13 and adjust trimmer capacitor C031 for 500KHz (±3.5Hz.)

Purity and Convergence Procedure

Adjustment should be necessary only if the CRT or deflection yoke is replaced or if someone has disturbed the setting. The complete procedure consists of:

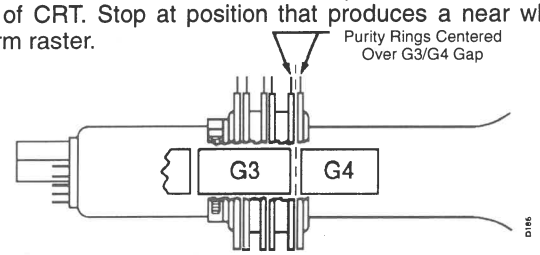
1. Initial static convergence
2. Setting purity
3. Final static convergence

When CRT or Yoke is Replaced

Place the yoke on the CRT neck (do not tighten clamp).

Position purity/convergence assembly as shown and tighten clamp snugly. Cut wax seal on assembly and place like tabs of purity device together at 12 o'clock to reduce its magnetic field effect. Manually degauss CRT.

Turn Receiver ON and slide deflection yoke back and forth on neck of CRT. Stop at position that produces a near white, uniform raster.



Positioning of Purity/Convergence Assembly

Initial Center Static Convergence

Connect dot/crosshatch generator to Receiver and tune in signal. Observe misconvergence at center of screen only.

Adjust 4 pole magnet (center rings): separate tabs and rotate device to converge blue with red.

Adjust 6 pole magnet (rear rings): separate tabs and rotate device to converge blue and red (magenta) with green. **NOTE:** Precise convergence at this point is not important.

Purity Adjustment

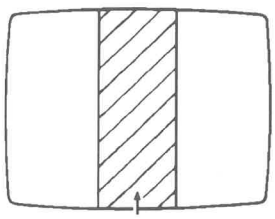
Operate the Receiver for 60 minutes with BRIGHT control at Maximum to stabilize the CRT.

Degauss the Receiver fully by using an external degaussing coil.

Short TP14 to ground for blank raster. Set VIDEO MENU BRIGHT to Mid position.

Turn red and blue LOW LIGHT controls fully counterclockwise to obtain a green field. Adjust DRIVE controls if green field is not obtained. Loosen the deflection yoke clamp screw and move the deflection yoke back as close to the purity magnet as possible.

Adjust the purity magnet to set the vertical green raster precisely at the center of the screen. (Shown below.)



Green Raster

Slowly move the deflection yoke forward and adjust for the best overall green screen.

Tighten the deflection yoke clamp screw.

Produce a blue and then red raster by adjusting LOW LIGHT controls and observe that good purity is obtained on each respective field.

Observe that uniform white raster is obtained by adjusting LOW LIGHT controls. If screen is not uniformly white, repeat above procedure.

Final Convergence Procedure

NOTE: Before attempting convergence adjustment, vertical size and focus adjustments must be completed. Connect a dot pattern generator to the set. The brightness level should be no higher than necessary to obtain a clear pattern.

Converge the red and blue dots at the center of the screen by rotating the 4 pole (R with B) Static Convergence Magnets.

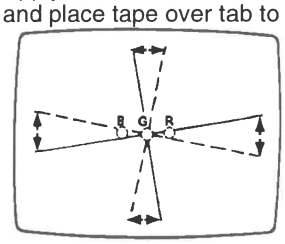
Align the converged red/blue dots with the green dots at the center of the screen by rotating the 6 pole (R/B with G) Static Convergence Magnets. Melt wax with soldering pencil to reseal magnets.

Slightly tilt (do not rotate) the deflection yoke vertically and horizontally to obtain good overall convergence.

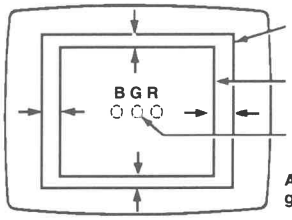
After vertical adjustment of the yoke, insert wedge at 11 o'clock position, then make the horizontal tilt adjustment.

Secure deflection yoke by inserting side two wedges at 3 and 7 o'clock positions.

Apply adhesive between tab (thin portion) of wedge and CRT and place tape over tab to secure CRT.



As the yoke is moved vertically, the rasters produced by the outside guns rotate in opposite directions.

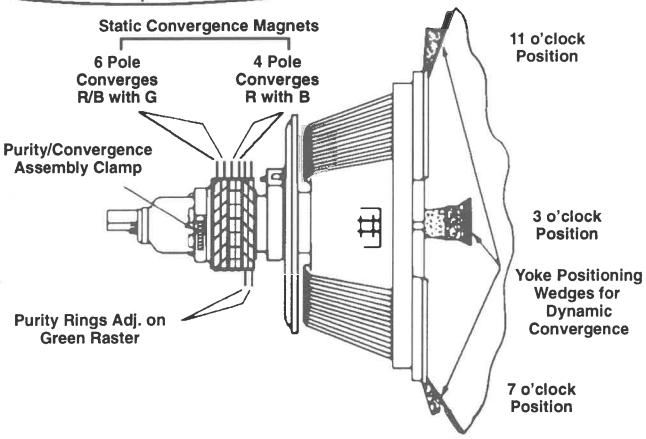


Raster produced from one of the outside electron beams

Raster from the other outside electron beam

Static convergence magnets are set for center convergence

As the yoke is moved horizontally, one raster gets larger while the other gets smaller


Static Convergence Magnets
6 Pole Converges R/B with G
4 Pole Converges R with B
11 o'clock Position
Purity/Convergence Assembly Clamp
3 o'clock Position
Yoke Positioning Wedges for Dynamic Convergence
Purity Rings Adj. on Green Raster
7 o'clock Position

Permalloy Convergence Corrector Strip (Part No. OFMK014ZZ)

This strip is used in some sets to match the yoke and CRT for optimum convergence. If the yoke or CRT is replaced, the strip may not be required.

First converge the set without the strip and observe the corners.

If correction is needed:

1. Place strip between CRT and yoke, in quadrant needing correction. Slowly move it around for desired results.
2. Press adhesive tightly to the CRT and secure with tape.

New Circuits

Horizontal Disable Circuit (X–Ray Protection)

This circuit protects against excessive high voltage. If for any reason high voltage exceeds a predetermined level, the circuit operates to shift horizontal frequency and limit high voltage.

Horizontal pulses from pin 6 of flyback transformer T551 are rectified by diode D531. The resultant positive DC voltage at the cathode of D531 is directly proportional to high voltage variations. This voltage is filtered and applied to the cathode of Zener diode D533 via R532/R533 precision resistive divider.

If high voltage should increase, the horizontal pulse amplitude at pin 6 of flyback T551 increases, so the positive voltage at the cathode of D531 also increases. At a specified high voltage level, the created positive voltage exceeds the Zener diode's break down voltage and it conducts to apply positive voltage to the base of Q533. R534 is added to ensure that Q533 is not activated by any circuit noise during normal operation when the Zener diode D533 is not conducting.

Q533 acts as a resistance in parallel with the Horizontal AFC Filter circuit R502/C506/C507. As it conducts, its resistance lowers and thus dampens the Horizontal AFC Filter circuit. This produces an increase in the horizontal oscillator frequency and lowers the high voltage.

Servicing Procedure

If the horizontal is off frequency, the cause must be determined to be either the disable circuit or horizontal circuit. Also, if the disable circuit does not operate during the "Horizontal Disable Test" specified in this manual, the fault must be corrected in order to insure that high voltage does not exceed safe operation parameters.

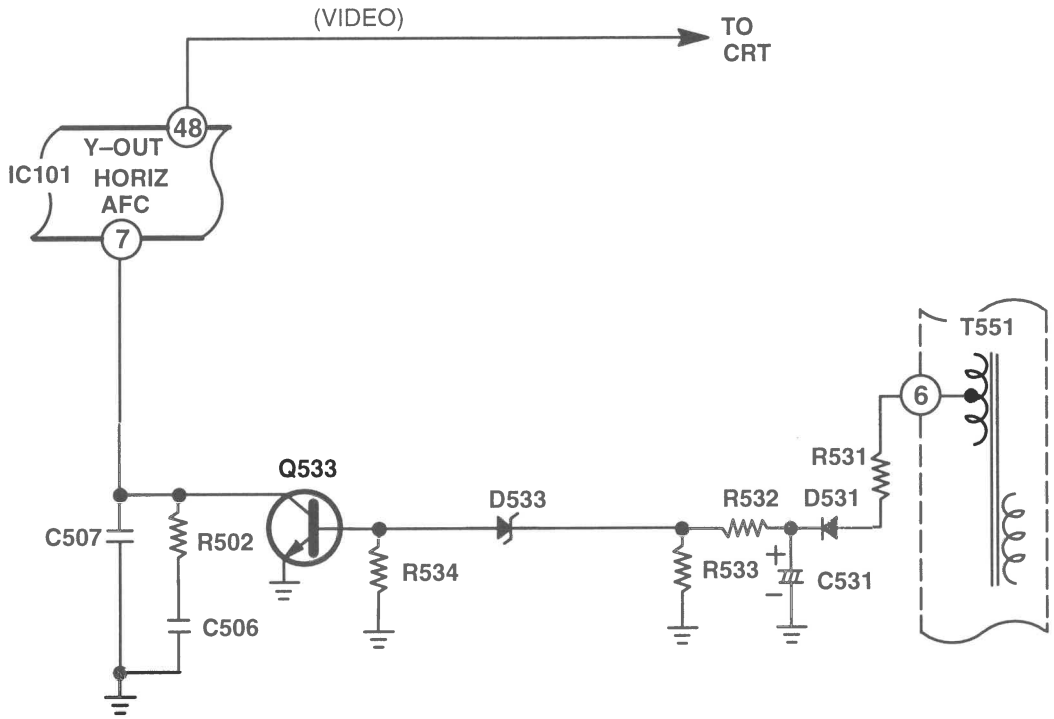
SYMPTOM – No Change in Frequency When "Horizontal Disable Test" is Performed.

NOTE: B+ (TP91) should increase between 153 – 162 volts when disable test is performed.

1. Turn ON Transistor Q533.
   Connect a 33k resistor jumper as follows:
   • Q533 – base to TPD7 (+12V)

Horizontal frequency should increase as the transistor is activated.

2. If Q533 turns ON, check voltage at base. If low or zero, check D533, R534, R532, C531, D531, R531 and the amplitude of waveform at Pin 6 of flyback transformer T551.



New Circuits

CRT Protection Circuit

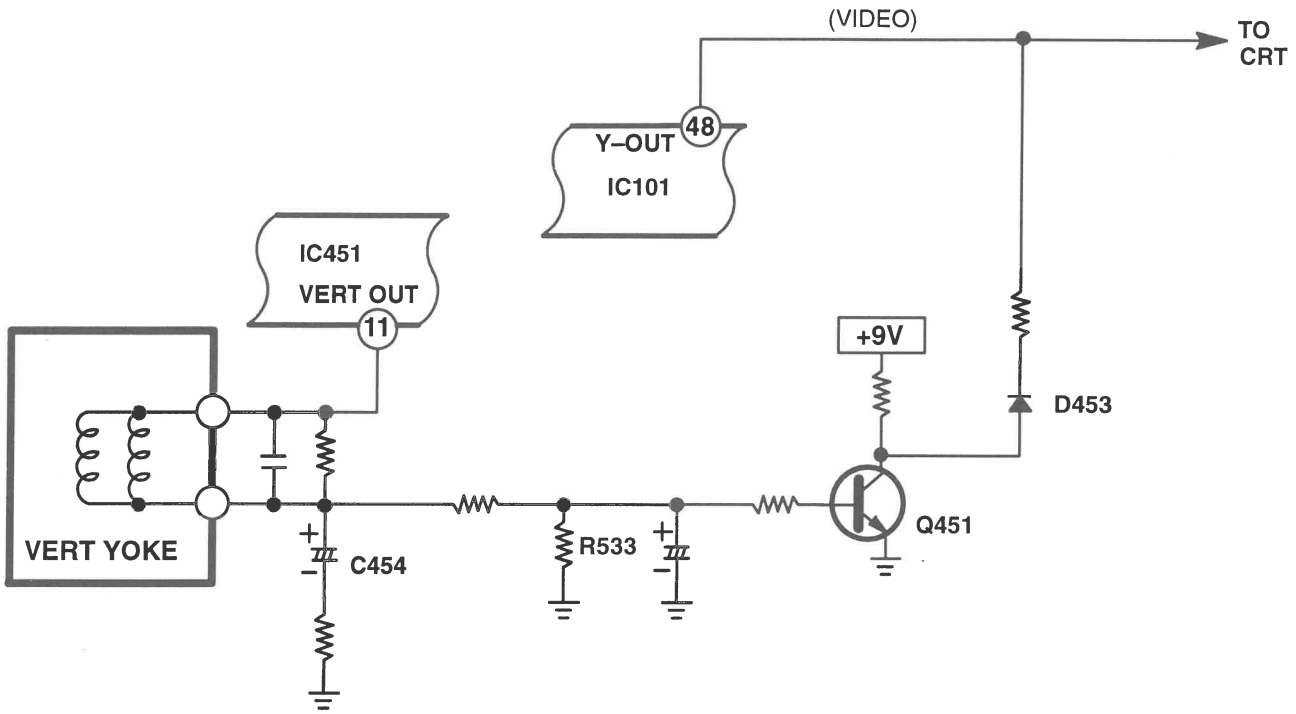
This circuit blanks the CRT in the event of vertical sweep loss and also functions as a CRT spot killer when the Receiver is turned OFF.

During normal operation the vertical sweep waveform from vertical output (IC451) supplies a positive voltage to the base of Q451. Its conduction grounds the anode of D453 and the diode does not conduct, to allow normal video.

Any failure mode causing loss of the vertical sweep waveform will allow the charge on C454 to discharge and results in the voltage at the base of Q451 to decrease and stop its conduction. This allows D453 to conduct and supply roughly +9 volts to the video path going to the CRT. The increased DC voltage drives the video information into the black area and blanks the CRT.

When the Receiver is turned OFF, the vertical sweep waveform disappears but the +9 volts decays slowly. Thus the circuit operates to blank the CRT to provide spot burn protection.

Note that any failure mode causing transistor Q451 to be non–conductive will result in the CRT to blank. The easiest way to confirm that the blanking circuit is active, causing a no raster symptom, is to measure the collector voltage of Q451. If it is approximately +9 volts, then D453 is conducting to cause CRT blanking.



REPLACEMENT PARTS LIST

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Ref. No.	Part No.	Description
		CAPACITORS
C001	ECKF1H103ZF	CAP,C .01UF–Z–50V
C002	ECEA1EU4R7	CAP,E 4.7UF/25V
C004	ECKF1H101KB	CAP,C 100PF–K–50V
C009	ECEA1HU010	CAP,E 1UF/50V
C013	ECKF1H103ZF	CAP,C .01UF–Z–50V
C014	ECEA0JU102	CAP,E 1000UF/6.3V
C017	ECEA0JU101	CAP,E 100UF/6.3V
C018	ECEA1CU100	CAP,E 10UF/16V
C019	ECKF1H103ZF	CAP,C .01UF–Z–50V
C021	ECKF1H821KB	CAP,C 820PF–K–50V
C022	ECCF1H330JP	CAP,C 33PF–J–50V
C023	ECCF1H150JP	CAP,C 15PF–J–50V
C024	ECEA0JU331	CAP,E 330UF/6.3V
C025	ECKF1H561KB	CAP,C 560PF–K–50V
C026	ECEA1CU102	CAP,E 1000UF/16V
C027	ECEA1CU100	CAP,E 10UF/16V
C028	ECEA1CU100	CAP,E 10UF/16V
C029	ECKF1H103ZF	CAP,C .01UF–Z–50V
C030	ECEA1CU100	CAP,E 10UF/16V
C031	ECRHA030E81	TRIMMER: 30PF
C034	ECKF1H103ZF	CAP,C .01UF–Z–50V
C035	ECKF1H103ZF	CAP,C .01UF–Z–50V
C036	ECEA0JU101	CAP,E 100UF/6.3V
C044	ECKF1H103ZF	CAP,C .01UF–Z–50V
C045	ECEA1CU471	CAP,E 470UF/16V
C057	ECEA1CU100	CAP,E 10UF/16V
C071	ECKF1H103ZF	CAP,C .01UF–Z–50V
C103	ECCF1H020CC	CAP,C 2PF–C–50V
C104	ECCF1H020CC	CAP,C 2PF–C–50V
C105	ECKF1H103ZF	CAP,C .01UF–Z–50V
C106	ECKF1H103ZF	CAP,C .01UF–Z–50V
C109	ECEA50ZR22	CAP,E .22UF/50V
C110	ECEA50ZR47	CAP,E .47UF/50V
C112	ECCF1H180JC	CAP,C 18PF–J–50V
C115	ECEA1AU101	CAP,E 100UF/10V
C119	ECQB1H183KF	CAP,P .018UF–K–50V
C120	ECEA0JU101	CAP,E 100UF/6.3V
C121	ECKF1H103ZF	CAP,C .01UF–Z–50V
C126	ECKF1H103ZF	CAP,C .01UF–Z–50V
C151	ECCF1H680JC	CAP,C 68PF–J–50V
C152	ECCF1H150JC	CAP,C 15PF–J–50V
C153	ECKF1H103ZF	CAP,C .01UF–Z–50V
C154	ECEA1HUR22	CAP,E .22UF/50V
C155	ECCF1H020CC	CAP,C 2PF–C–50V
C201	ECQB1H682KF	CAP,P .0068UF–K–50V
C202	ECEA1HU010	CAP,E 1UF/50V
C203	ECKF1H103ZF	CAP,C .01UF–Z–50V
C204	ECEA1HU101	CAP,E 100UF/50V
C205	ECEA1HU010	CAP,E 1UF/50V
C207	ECCF1H680KP	CAP,C 68PF–K–50V
C208	ECEA1CU220	CAP,E 22UF/16V
C209	ECKF1H332KB	CAP,C .0033UF–K–50V
C210	ECEA1CU100	CAP,E 10UF/16V
C211	ECEA1EU102	CAP,E 1000UF/25V
C212	ECKF1H103ZF	CAP,C .01UF–Z–50V
C213	ECEA1EU221	CAP,E 220UF/25V
C214	ECEA1CU100	CAP,E 10UF/16V
C215	ECQB1H683KF	CAP,P .068UF–K–50V
C301	ECEA1CN330S	CAP,E 33UF/16V
C302	ECEA1CU330	CAP,E 33UF/16V
C305	ECEA1CU100	CAP,E 10UF/16V
C306	ECEA1CU100	CAP,E 10UF/16V
C307	ECEA1HUR22	CAP,E .22UF/50V
C309	ECEA1HU010	CAP,E 1UF/50V
C310	ECEA1HU010	CAP,E 1UF/50V
C312	ECEA1CU220	CAP,E 22UF/16V
C314	ECCF1H330JC	CAP,C 33PF–J–50V
C350	ECKD3D681KB	CAP,C 680PF–K–2KV
C351	ECKF1H681KB	CAP,C 680PF–K–50V
C352	ECKF1H561KB	CAP,C 560PF–K–50V
C353	ECKF1H681KB	CAP,C 680PF–K–50V
C355	ECKD2H102KB	CAP,C .001UF–K–500V
C360	ECKF1H331KB	CAP,C 330PF–K–50V
C361	ECEA2AU100	CAP,E 10UF/100V
C401	ECEA1HU010	CAP,E 1UF/50V
C402	ECQB1H223KF	CAP,P .022UF–K–50V
C403	ECEA1HU2R2	CAP,E 2.2UF/50V
C405	ECKF1H122KB	CAP,C .0012UF–K–50V
C451	ECEA1CU101	CAP,E 100UF/16V
C452	ECSF1EE105VB	CAP,T 1.0/25V
C453	ECEA50Z1R5	CAP,E 1.5UF/50V
C454	ECEA1CU222	CAP,E 2200UF/16V
C455	ECEA1VU101	CAP,E 100UF/35V
C457	ECEA1HU0R1	CAP,E .1UF/50V
C458	ECEA1CU100	CAP,E 10UF/16V
C460	ECKD2H101KB	CAP,C 100PF–K–500V
C501	ECQB1H822KF	CAP,P .0082UF–K–50V
C502	ECQB1H183KF	CAP,P .018UF–K–50V
C503	ECCF1H221JU	CAP,C 220PF–J–50V
C504	ECEA1AU101	CAP,E 100UF/10V
C505	ECKF1H221KB	CAP,C 220PF–K–50V
C506	ECEA1HU010	CAP,E 1UF/50V
C507	ECQB1H333KF	CAP,P .033UF–K–50V
C510	ECQB1H473KF	CAP,P .047UF–K–50V
C512	ECKF1H561KB	CAP,C 560PF–K–50V
C513	**ECCD2H100F**	**CAP,C 10PF–F–500V**
C514	**ECKD2H821KB**	**CAP,C 820PF–K–500V**
C515	**ECKD2H821KB**	**CAP,C 820PF–K–500V**
C518	ECQB1H223KF	CAP,P .022UF–K–50V
C531	**ECEA1EU330**	**CAP,E 33UF/25V**
C541	ECKF1H122KB	CAP,C .0012UF–K–50V
C551	**ECQF2H224JS**	**CAP,P .22UF–J–200V**
C552	**ECEA1EU221**	**CAP,E 220UF/25V**
C553	**ECEA2EU220**	**CAP,E 22UF/250V**
C554	**ECKD2H561KB**	**CAP,C 560PF–K–500V**
C555	**ECKD2H561KB**	**CAP,C 560PF–K–500V**
C557	ECEA1HU2R2	CAP,E 2.2UF/50V
C558	ECEA1AU331	CAP,E 330UF/10V
C559	**ECEA1EGE221**	**CAP,E 220UF/25V**
C562	**ECKD3D122JB**	**CAP,C .0012UF–J–2KV**
C564	**ECWH12H472JS**	**CAP,P .0047UF–J–1.2KV**
C566	**ECEA1VGE221**	**CAP,E 220UF/35V**
C567	ECKF1H103ZF	CAP,C .01UF–Z–50V
C568	**ECKD2H561KB**	**CAP,C 560PF–K–500V**
C570	ECEA1EU221	CAP,E 220UF/25V
C571	ECKF1H103ZF	CAP,C .01UF–Z–50V
C601	ECKF1H103ZF	CAP,C .01UF–Z–50V
C605	ECCF1H080DU	CAP,C 8PF–D–50V
C606	ECEA1HUR47	CAP,E .47UF/50V
C607	ECKF1H101KB	CAP,C 100PF–K–50V
C608	ECKF1H101KB	CAP,C 100PF–K–50V
C609	ECKF1H101KB	CAP,C 100PF–K–50V
C611	ECCF1H101JC	CAP,C 100PF–J–50V
C612	ECCF1H101JC	CAP,C 100PF–J–50V
C625	ECEA1CU100E	CAP,C 10UF/16V
C626	ECKF1H271KB	CAP,C 270PF–K–50V
C803	**ECKD2H472PU**	**CAP,C .0047UF–P–500V**
C804	**ECKD2H472PU**	**CAP,C .0047UF–P–500V**
C805	**ECES2DU221E4**	**CAP,E 220UF/200V**
C806	**ECEA2CGE100**	**CAP,E 10UF/160V**
C812	**ECEA160V33Z**	**CAP,E 33UF/160V**
C817	**ECQU1A153KH**	**CAP,P .015UF–K–125VAC**
C818	**ECQU1A153KH**	**CAP,P .015UF–K–125VAC**
		DIODES
D004	MA165	DIODE
D005	MA4051L	DIODE, ZENER
D020	MA165	DIODE
D021	MA27	DIODE
D022	MA165	DIODE
D025	1N4532	DIODE
D031	ERA15–01	DIODE
D032	1N4532	DIODE
D034	SEL1320G	DIODE, LED

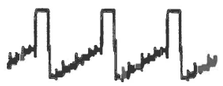
Waveforms – A–Schematic

All Waveforms are (⏚) Cold Ground except No. 15 which is (⏚) Hot Ground.

① ② ⑤ 1.5V p–p [20µs]

③ 0.3V p–p [20µs]

④ 3.0V p–p [20µs]

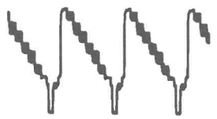


⑥ 3.3V p–p [20µs]

⑦ .96V p–p [20µs]

⑧ 2.2V p–p [20µs]

⑨ 1V p–p [20µs]

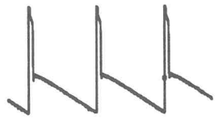


⑩ 2.5V p–p [5ms]

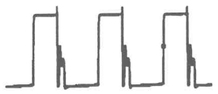
⑪ 7.5V p–p [5ms]

⑫ 1.6V p–p [5ms]

⑬ 54V p–p [5ms]

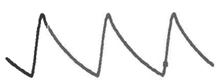


⑭ 3.8V p–p [2µs]

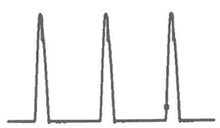


⑮ ⏚ 155.5V p–p [20µs]

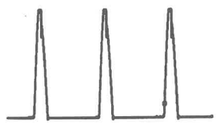
⑯ 1V p–p [20µs]



⑰ 23V p–p [20µs]



⑱ 204V p–p [20µs]



⑲ 218V p–p [20µs]

⑳ 162V p–p [20µs]

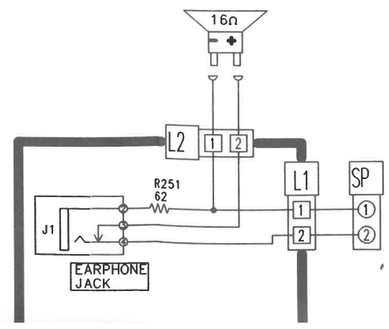
㉑ 164V p–p [20µs]

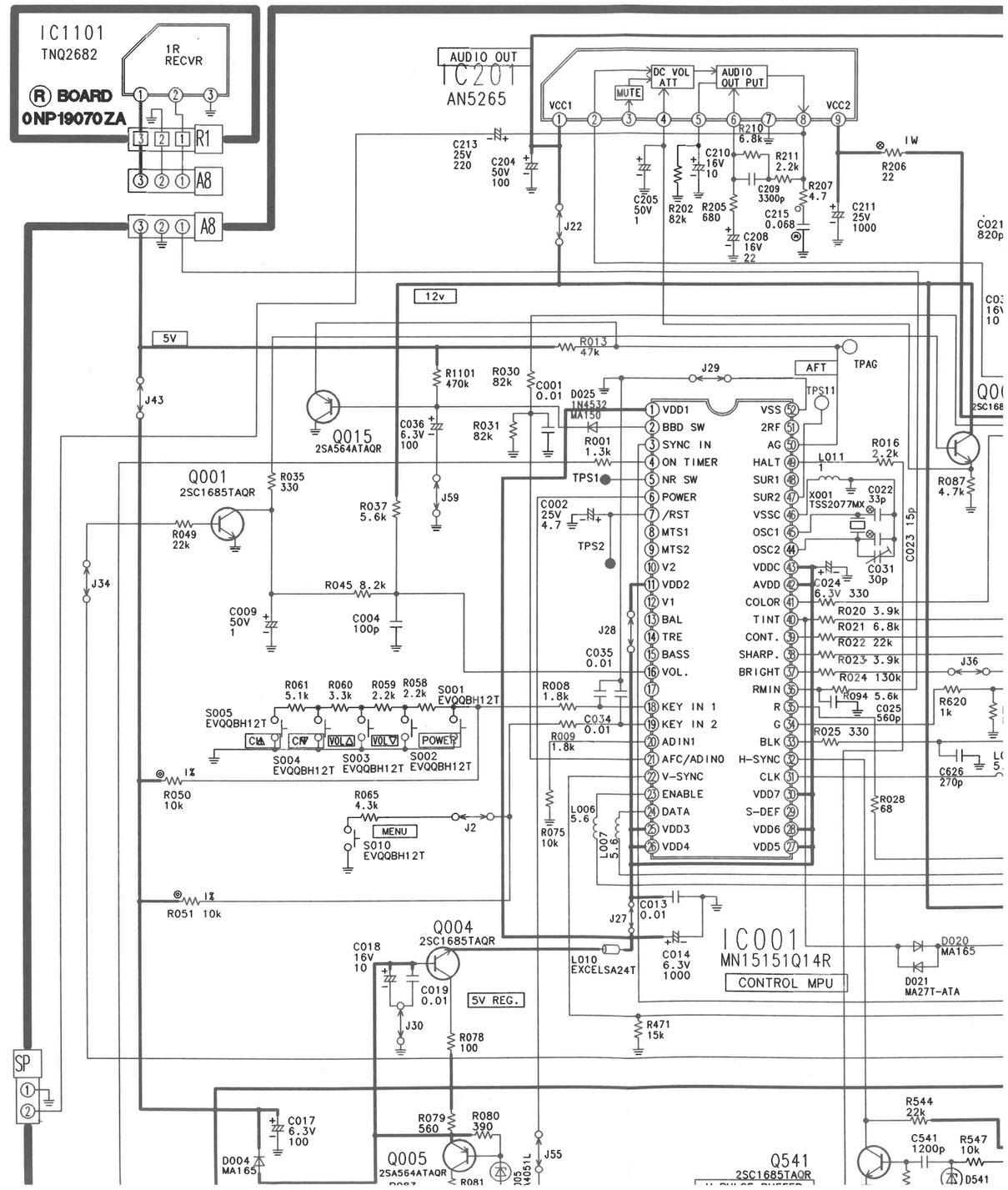
Circuit Board Function Index

CIRCUIT BOARDS	FUNCTION
A–BOARD	MAIN
C–BOARD	CRT
L–BOARD	LED INDICATOR/EARPHONE
R ASSEMBLY	REMOTE RECEIVER
Y–BOARD	SUB TINT

IMPORTANT SAFETY NOTICE

THE BOXED AREA ON THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE BOXED AREAS OF THE SCHEMATIC.





A, C, L, R & Y–Board Schematics (CT–10R11S/CS & TP1016K)

nction Index

ICTION

N

INDICATOR/EARPHONE
IOTE RECEIVER
TINT

TICE
CORPORATES SPECIAL
DIATION FIRE AND
IS ESSENTIAL THAT ONLY
HE CRITICAL COMPONENTS

IC1101
TNQ2682
1R RECVR
R BOARD
0NP19070ZA
R1
A8
A8

AUDIO OUT
IC201
AN5265
DC VOL ATT
MUTE
AUDIO OUT PUT
VCC1
VCC2
C213 25V 220
C204 50V 100
C205 50V 1
C210 16V 10
R202 82k
R205 680
R210 6.8k
R211 2.2k
C209 3300p
C215 0.068
R207 4.7
C208 16V 22
C211 25V 1000
R206 22 1W
J22

12v
5V
J43
R013 47k
TPAG
AFT
TPS11
J29
R1101 470k
R030 82k
C001 0.01
D025 1N4532 MA150
C036 6.3V 100
R031 82k
Q015 2SA564ATAQR
R001 1.3k
TPS1
C002 25V 4.7
TPS2
Q001 2SC1685TAQR
R035 330
R037 5.6k
J59
R049 22k
J34
R045 8.2k
C009 50V 1
C004 100p
J28
C035 0.01
R008 1.8k
C034 0.01
R009 1.8k
R075 10k
L006 5.6
L007 5.6
R061 5.1k
R060 3.3k
R059 2.2k
R058 2.2k
S001 EVQQBH12T
S005 EVQQBH12T
CH∧
CH∨
VOL∧
VOL∨
POWER
S004 EVQQBH12T
S003 EVQQBH12T
S002 EVQQBH12T
R050 10k 1%
R065 4.3k
MENU
S010 EVQQBH12T
J2
R051 10k 1%
J27
C013 0.01
C014 6.3V 1000
L010 EXCELSA24T
IC001
MN15151Q14R
CONTROL MPU
D020 MA165
D021 MA27T-ATA
R471 15k
C018 16V 10
Q004 2SC1685TAQR
C019 0.01
5V REG.
J30
R078 100
C017 6.3V 100
D004 MA165
R079 560
R080 390
Q005 2SA564ATAQR
R081
J55
Q541 2SC1685TAQR
R544 22k
C541 1200p
R547 10k
D541
R055 47 ½W
D022 MA165
R559 100 3W
C567
J44
R560 100 2W
COLD

VCC1 VCC2
1 2 3 4 5 6 7 8 9
MUTE DC VOL ATT AUDIO OUT PUT

VDD1 BBD SW SYNC IN ON TIMER NR SW POWER /RST MTS1 MTS2 V2 VDD2 V1 BAL TRE BASS VOL. KEY IN 1 KEY IN 2 ADIN1 AFC/ADIN0 V-SYNC ENABLE DATA VDD3 VDD4
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

VSS 2RF AG HALT SUR1 SUR2 VSSC OSC1 OSC2 VDDC AVDD COLOR TINT CONT. SHARP. BRIGHT RMIN R G BLK H-SYNC CLK VDD7 S-DEF VDD6 VDD5
52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27

UHF/VHF 75Ω
ENV568C4G3–USA
ENV568C5G3
ENV568C5G3–CANADA
IF
BM
ENABLE
DATA
BL
CLOCK
BH
33V
BP(5V)
BU
AGC
R095 100
R096 100
R097 100
R088 18k
C026 16V 1000
C027 16V 10
C021 820p
C030 16V 10
J13
D557 QB105N
C028 16V 10
C029 0.01
Q006 2SC1685TAQR
R087 4.7k
R074 68k 1W
R304 2kB
R301 470
SUB CONT
L301 ELB5A082
R303 1.8k
J36
R620 1k
R621 8.2k
C626 270p
L008 5.6
R028 68
J47
TPD7
J19
J46
J20
J35
Q316 2SC1685TAQR
R326 5.6k
C570 25V 220
R320 10k
C309 50V 1
D503 MA165
R512 3.3k
R515 270

X101 EFCH45MVK12N
L108 1.2
L104 1.2
TP15
TPS8
J16
J40
R072 47k
J39
5V
TPD11
C121 0.01
C057 16V 10
R071 1.8k
C109 50V 0.22
RF AGC
R107 560
R108 5kB
TP14
R201 1k
C202 50V 1
TP16
C071 0.01
R212 3.3k
J26
J12
C120 6.3V 100
C105 0.01
C106 0.01
C104 2p
R334 1k
R604 220k
C606 50V 0.47
C605 8p
X601 TSS816MX TSS816D1
C310 50V
TP47R
C119 0.018
L201 TLS63318-2
C201 6800p
Q301 2SC1685TAQR
C214 16V 10
R209 820
J52
TPA2
C126 0.01
C112 18p
C103 2p
C301 16V 33
J41
C203 0.01
R214 10k
R213 1k
X201 EFCS4R5MS4
C212 0.01
C153 0.01
C155 2p
TPD10
R152 100k
J51
R151 270k
C154 50V 0.22
C151 68p
C152 15p
R153 4.7k
R108 2.2k
L109 EXCELSA35B OR TSC9254
L105 TL11158755
R112 120
TPA1
C110 50V 0.47
C518 0.022
R203 470
TP21
TPA11
L103 TL167394-1
R109 220
C601 0.01
C602 1200p
C611 100p
R401 680k
C403 50V 2.2
C405 50V 1
C501
D502 MA4082
C401 50V 1
C402 0.022
C502 0.018
R524 82
R508 2.2k
C512
D506 MA4062
R503 3.9k
C510 0.047
R403 270
Q102 2SC1685TAQR
R110 8.2k
TP12
C115 10V 100
R111 22k
J56
L106 15
X102 EFCS4R5MW3BA SFE4.5MBF TPS4.5MC6
Q019 2SC1685TAQR
J50
R086 47k
R085 39k
J49
R601 330
C611 100p
C612 100p
L601 10
C606 50V 0.47
C605 8p
X601 TSS816MX TSS816D1
C310 50V
TP47R
R604 220k
R334 1k
C121 0.01
C105 0.01
C106 0.01
C104 2p
J12
C120 6.3V 100
J26
R212 3.3k
C207 68p
C119 0.018
L201 TLS63318-2
C201 6800p
Q301 2SC1685TAQR
C214 16V 10
R209 820
J52
TPA2
C126 0.01
C112 18p
C103 2p
C301 16V 33
J41
C203 0.01
R214 10k
R213 1k
X201 EFCS4R5MS4
C212 0.01
C153 0.01
C155 2p
TPD10
R152 100k
J51
R151 270k
C154 50V 0.22
C151 68p
C152 15p
R153 4.7k
R108 2.2k
L109 EXCELSA35B OR TSC9254
L105 TL11158755
R112 120
TPA1
C110 50V 0.47
C518 0.022
R203 470
TP21
TPA11
L103 TL167394-1
R109 220
C601 0.01
C602 1200p
C611 100p
R401 680k
C403 50V 2.2
C405 50V 1
C501
D502 MA4082
C401 50V 1
C402 0.022
C502 0.018
R524 82
R508 2.2k
C512
D506 MA4062
R503 3.9k
C510 0.047
R403 270
Q102 2SC1685TAQR
R110 8.2k
TP12
C115 10V 100
R111 22k
J56
L106 15
X102 EFCS4R5MW3BA SFE4.5MBF TPS4.5MC6
Q019 2SC1685TAQR
J50
R086 47k
R085 39k
J49
R201 1k
C202 50V 1
TP16
C071 0.01
R212 3.3k
J26
J12
C120 6.3V 100
C105 0.01
C106 0.01
C104 2p
R334 1k
R604 220k
C606 50V 0.47
C605 8p
X601 TSS816MX TSS816D1
C310 50V
TP47R
C119 0.018
L201 TLS63318-2
C201 6800p
Q301 2SC1685TAQR
C214 16V 10
R209 820
J52
TPA2
C126 0.01
C112 18p
C103 2p
C301 16V 33
J41
C203 0.01
R214 10k
R213 1k
X201 EFCS4R5MS4
C212 0.01
C153 0.01
C155 2p
TPD10
R152 100k
J51
R151 270k
C154 50V 0.22
C151 68p
C152 15p
R153 4.7k
R108 2.2k
L109 EXCELSA35B OR TSC9254
L105 TL11158755
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C110 50V 0.47
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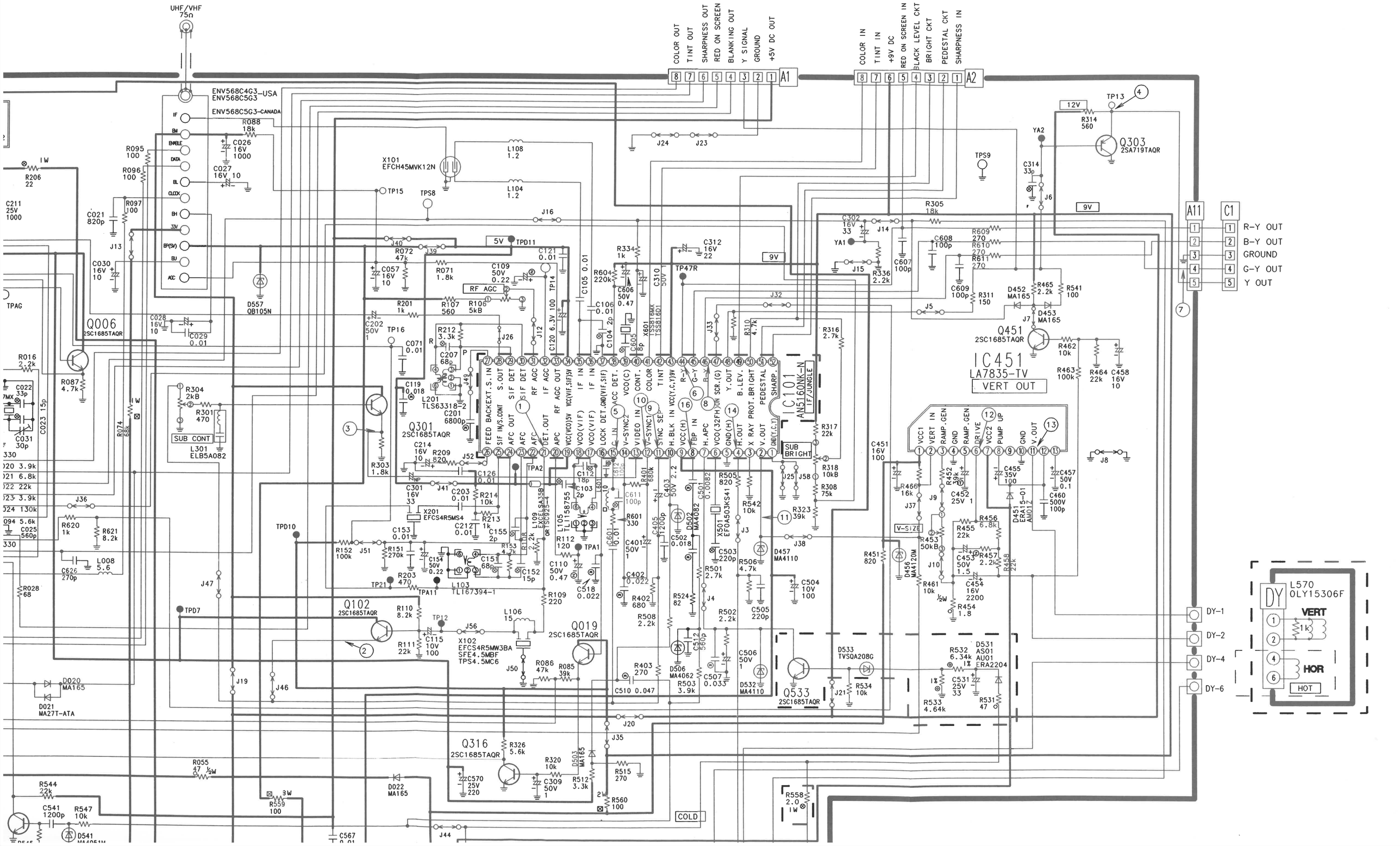
R203 470
TP21
TPA11
L103 TL167394-1
R109 220
C601 0.01
C602 1200p
C611 100p
R401 680k
C403 50V 2.2
C405 50V 1
C501
D502 MA4082
C401 50V 1
C402 0.022
C502 0.018
R524 82
R508 2.2k
C512
D506 MA4062
R503 3.9k
C510 0.047
R403 270
Q102 2SC1685TAQR
R110 8.2k
TP12
C115 10V 100
R111 22k
J56
L106 15
X102 EFCS4R5MW3BA SFE4.5MBF TPS4.5MC6
Q019 2SC1685TAQR
J50
R086 47k
R085 39k
J49

J24
J2
J16
J40
J39
J12
J26
J52
J41
J51
J47
J19
J46
J20
J35
J44
J49

COLOR OUT
TINT OUT
8 7

16Ω
2
1 2
L1
1 2
SP
1 2
SP
1 2

Y–Board Schematics (CT–10R11S/CS & TP1016K)



Waveform Measurements

1. Taken with a standard gated rainbow generator connected to antenna terminal.
2. Secondary Operating Controls (Video/Audio Menu) are set to Normalize. Volume "MIN".
3. All video and color waveforms taken with a wideband scope and a probe with low capacity (10 to 1). Shape and peak amplitudes may vary depending on type of Oscilloscope used and calibration.
4. Ground symbol ⏚ (HOT) or ⏚ (COLD) indicates ground lead connection of Oscilloscope.

CAUTION: Incorrect ground connection of test equipment will result in erroneous readings.

These waveforms have been taken in the order of circuit flow through the various sections as follows:

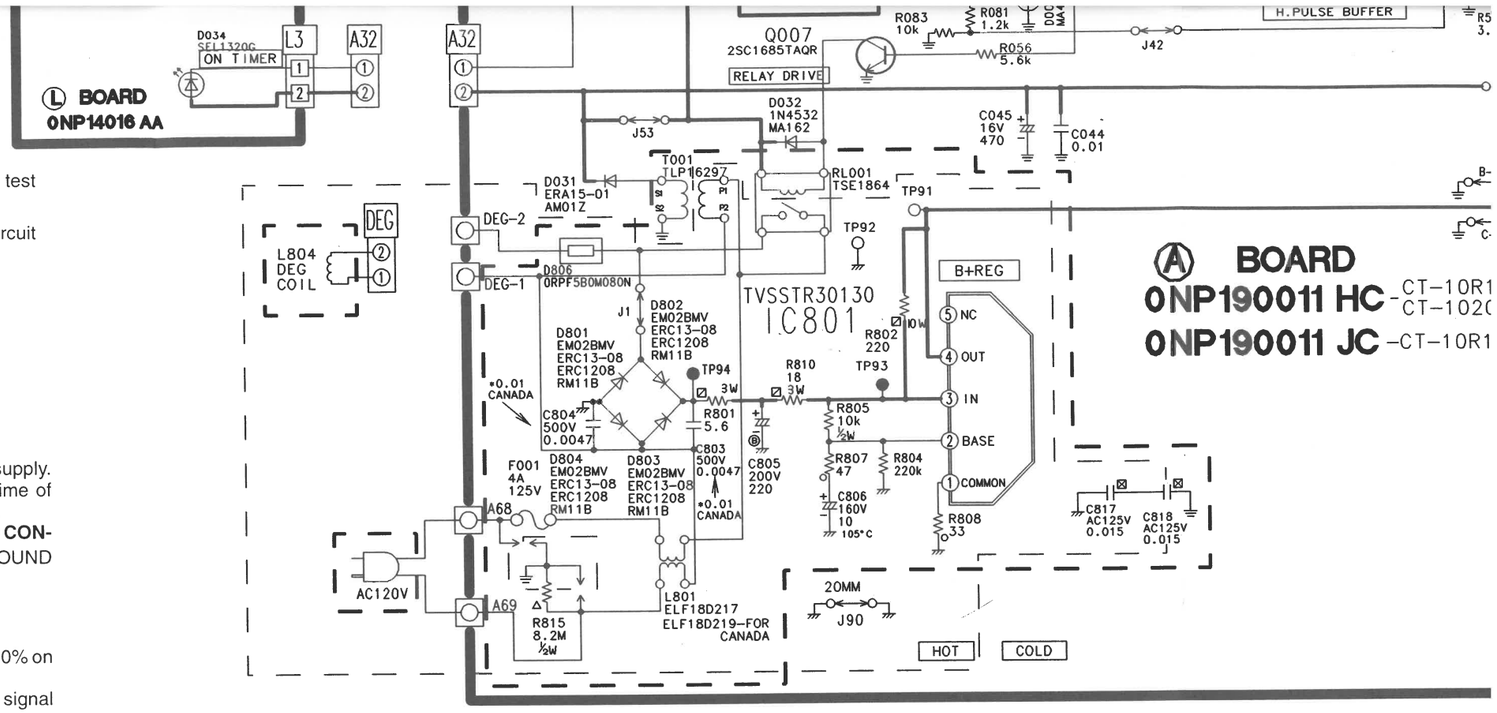
VIDEO – Waveforms 1~4
COLOR – Waveforms 5~8
VERTICAL – Waveforms 9~13
HORIZONTAL – Waveforms 14~16
POWER SUPPLY – 17~21

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in μH.
4. Test point indicated by ⚲, Test point but no pin ⚲.
5. When arrows [ ] used connections are easily found along with direction of arrow.
6. **— (BOLD LINES)** Indicates the route of B+ supply.
7. This schematic diagram is the latest at the time of printing and subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION** and ⏚ indicates COLD GROUND CONNECTION.

Voltage Measurements

1. Voltage measurement:
   - AC input to Receiver is 120V. Gated rainbow generator connected to antenna of Receiver.
   - All video and audio controls set to normalized position.
     TV ANT mode
     Volume – MIN
   - Voltage readings are nominal and vary ±10% on active devices.
     Some voltage readings will vary with signal strength and picture content.
   - Supply voltages are all nominal.
2. Ground symbol ⏚ or ⏚ indicates ground lead connection of meter. **Caution: Incorrect ground connection will result in erroneous readings.**



Important Service Note:

The bottom surface of the printed circuit board is covered with conformal coating.

- Probes must penetrate the conformal coating for proper readings.
- Lightly scrape conformal coating away from areas to be soldered.

Voltage Chart (All Models)

A–Board

Integrated Circuits (ICs)

IC001				IC101				IC201		IC551	
1	5.3	27	5.3	1	0	27	2.2	1	11.8	1	15.7
2	0	28	5.3	2	7.1	28	2.0	2	5.3	2	0
3	4.2	29	0	3	0	29	2.9	3	0	3	11.8
4	12.0	30	5.3	4	0.7	30	2.9	4	0.1		
5	0	31	0.1	5	0	31	2.6	5	8.1		
6	5.0	32	4.2	6	2.1	32	2.5	6	8.3	IC801 ⏚	
7	5.2	33	0.7	7	4.2	33	2.1	7	0	1	0.2
8	5.3	34	0.1	8	2.4	34	5.0	8	8.3	2	130.8
9	0	35	0.8	9	6.1	35	2.8	9	18.7	3	143.7
10	0	36	5.3	10	1.4	36	2.8			4	129.7
11	5.3	37	2.5	11	2.6	37	0			5	0
12	0	38	2.6	12	7.9	38	7.1				
13	0.1	39	5.0	13	2.2	39	3.4	IC451			
14	0.1	40	2.6	14	5.6	40	4.0	1	12.3		
15	0.1	41	2.5	15	7.3	41	2.7	2	7.1		
16	0.2	42	5.3	16	8.3	42	3.3	3	6.2		
17	0	43	5.3	17	1.5	43	8.9	4	0		
18	5.3	44	2.2	18	1.5	44	5.3	5	6.0		
19	5.3	45	2.3	19	5.0	45	5.4	6	6.0		
20	0	46	0	20	1.9	46	5.3	7	25.8		
21	1.9	47	5.2	21	3.8	47	0	8	1.6		
22	4.3	48	0	22	2.6	48	4.3	9	1.3		
23	0.5	49	5.3	23	2.6	49	7.3	10	0		
24	0.2	50	5.3	24	6.3	50	7.3	11	14.0		
25	5.3	51	0	25	3.2	51	7.3	12	26.2		
26	5.3	52	0	26	0.5	52	3.3	13	5.2		

Transistors

Ref.	b	c	e
Q001	0	0.2	0
Q004	5.9	9.7	5.2
Q005	5.1	5.9	5.9
Q006	0.2	11.8	0.1
Q007	0.7	0.1	0
Q015	5.2	0	5.3
Q019	8.3	8.9	7.7
Q102	8.3	11.8	7.6
Q301	1.4	11.8	0.8
Q303	4.3	0	4.9
Q316	0.7	0	0
Q451	0.6	0.1	0
Q501	0	78.3	0
Q533	0.4	4.2	0
Q541	–0.2	4.3	0
⏚ Q551	0	135.1	–0.2

The Functions listed below are activated by a DC voltage change to DAC Inputs (Pin 18 and 19) of MPU IC001. Pins 18 and 19 are normally 4.6V~5.0V. Press and hold function button on Receiver to take voltage readings.

FUNCTION	PIN 18	PIN 19
POWER	0V~0.6V	4,6V~5.0V
VOL▼	0.7V~1.2V	4.6V~5.0V
VOL▲	1.3V~1.8V	4.6V~5.0V
CH▼	1.9V~2.4V	4.6V~5.0V
CH▲	2.6V~3.0V	4.6V~5.0V
MENU	4.6V~5.0V	1.3V~1.8V
TV/VIDEO	4.6V~5.0V	1.9V~2.4V

C–Board (All Models)

Transistors

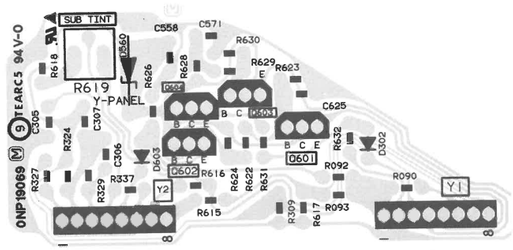
Ref.	b	c	e
Q351	5.1	122.8	4.9
Q352	5.1	122.6	4.9
Q353	5.1	124.3	4.8

Y–Board (All Models)

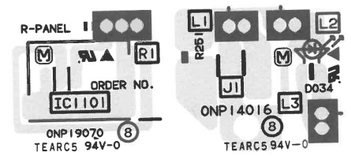
Transistors

Ref.	b	c	e
Q601	1.5	1.0	0.9
Q602	1.0	7.8	0.4
Q603	1.9	2.3	1.2
Q604	2.4	7.8	1.7

Y–Board ONP19069



R–Board ONP19070



L–Board ONP14016

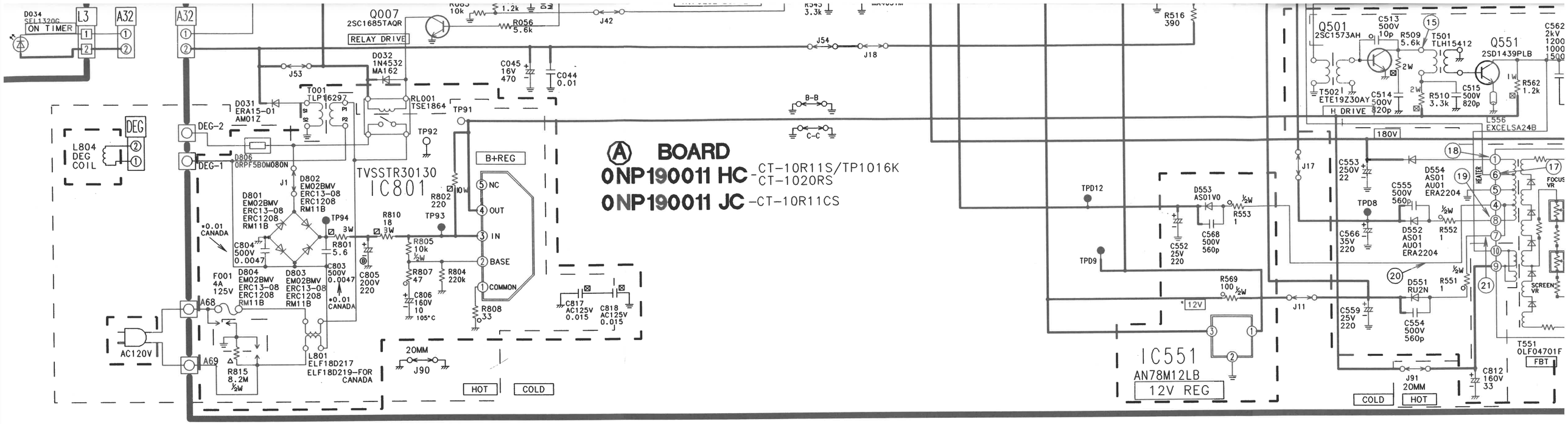
U/V tuner voltage

Enable, Data, an

NOTE: Voltage a
chart dep

TV Posit

	CH	VOLT	CH	V
VHF	2	3.7	25	
	3	4.6	26	
	4	5.7	27	
	5	7.8	28	
	6	9.0	29	
	7	7.3	30	
	8	7.8	31	
	9	8.3	32	
	10	8.8	33	
	11	9.4	34	
	12	9.9	35	
	13	10.4	36	
UHF	14	7.7	37	
	15	8.0	38	
	16	8.3	39	
	17	8.6	40	
	18	8.8	41	
	19	9.1	42	
	20	9.4	43	
	21	9.7	44	
	22	9.9	45	
	23	10.2	46	
	24	10.5	47	



-Board (All Models)

ansistors

	b	c	e
1	5.1	122.8	4.9
2	5.1	122.6	4.9
3	5.1	124.3	4.8

-Board (All Models)

ansistors

	b	c	e
1	1.5	1.0	0.9
2	1.0	7.8	0.4
3	1.9	2.3	1.2
4	2.4	7.8	1.7

voltage change to DAC Inputs
re normally 4.6V~5.0V. Press and
eadings.

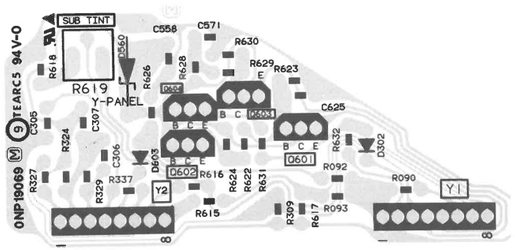
PIN 19
4,6V~5.0V
4.6V~5.0V
4.6V~5.0V
4.6V~5.0V
4.6V~5.0V
1.3V~1.8V
1.9V~2.4V

Important Service Note:

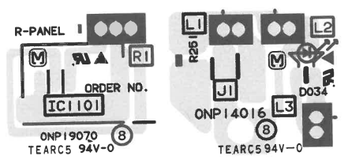
The bottom surface of the printed circuit board is covered with conformal coating.

- Probes must penetrate the conformal coating for proper readings.
- Lightly scrape conformal coating away from areas to be soldered.

Y–Board ONP19069



R–Board ONP19070



L–Board ONP14016

Tuner Voltage Chart

U/V tuner voltage test points are located and designated on the circuit side of A–Board.
BP 5V BM 12V AGC 7.5V

Enable, Data, and Clock have no DC readings. They are digital signals from the MPU.

NOTE: Voltage at the 30V test pin varies with channel selection. Please refer to correct chart depending on TV/CATV(CABLE) switch position.

TV Position

	CH	VOLT	CH	VOLT	CH	VOLT
VHF	2	3.7	25	10.7	48	16.4
	3	4.6	26	11.0	49	16.7
	4	5.7	27	11.3	50	16.9
	5	7.8	28	11.5	51	17.2
	6	9.0	29	11.8	52	17.5
	7	7.3	30	12.0	53	17.8
	8	7.8	31	12.3	54	18.1
	9	8.3	32	12.5	55	18.4
	10	8.8	33	12.8	56	18.7
	11	9.4	34	13.0	57	19.1
	12	9.9	35	13.3	58	19.4
	13	10.4	36	13.5	59	19.8
UHF	14	7.7	37	13.7	60	20.2
	15	8.0	38	14.0	61	20.6
	16	8.3	39	14.2	62	21.0
	17	8.6	40	14.5	63	21.5
	18	8.8	41	14.7	64	21.9
	19	9.1	42	14.9	65	22.4
	20	9.4	43	15.2	66	22.9
	21	9.7	44	15.4	67	23.5
	22	9.9	45	15.7	68	24.1
	23	10.2	46	15.9	69	24.7
	24	10.5	47	16.2		

Cable Position

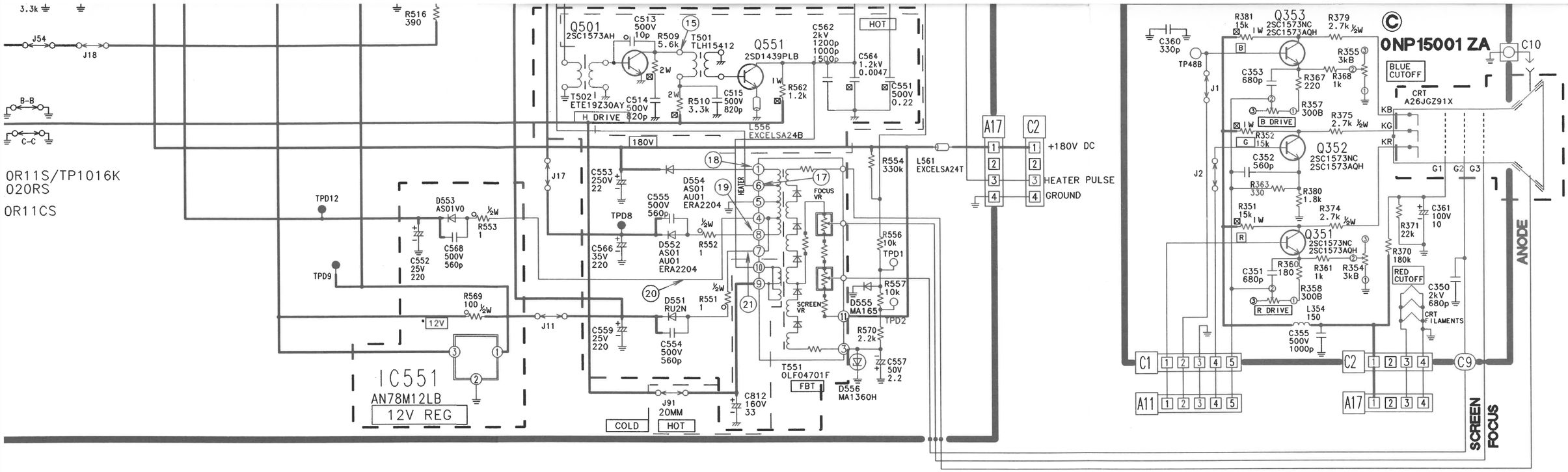
	CH	VOLT	CH	VOLT	CH	VOLT	CH	VOLT
CABLE	01	6.7	26	12.2	51	4.2	76	10.6
	02	3.8	27	12.7	52	4.4	77	10.9
	03	4.7	28	13.1	53	4.7	78	11.2
	04	5.7	29	13.5	54	4.9	79	11.4
	05	7.8	30	14.0	55	5.1	80	11.7
	06	9.1	31	14.5	56	5.3	81	11.8
	07	7.3	32	14.9	57	5.6	82	12.2
	08	7.9	33	15.5	58	5.8	83	12.4
	09	8.4	34	16.0	59	6.1	84	12.7
	10	9.0	35	16.5	60	6.3	85	12.9
	11	9.5	36	17.1	61	6.6	86	13.2
	12	10.0	37	17.7	62	6.8	87	13.4
	13	10.4	38	18.3	63	7.1	88	13.7
	14	18.2	39	19.1	64	7.4	89	13.9
	15	22.0	40	19.8	65	7.6	90	14.1
	16	3.9	41	20.6	66	7.9	91	14.4
	17	4.3	42	21.5	67	8.2	92	14.6
	18	4.7	43	22.5	68	8.5	93	14.9
	19	5.2	44	23.7	69	8.7	94	15.1
	20	5.6	45	24.9	70	9.0	95	10.2
	21	6.3	46	26.3	71	9.3	96	12.0
	22	6.8	47	3.5	72	9.5	97	13.4
	23	10.9	48	3.7	73	9.8	98	14.8
	24	11.3	49	3.9	74	10.1	99	16.5
	25	11.8	50	4.1	75	10.4		

MICROPROCESSOR PROGRAMMING FOR BAI

54MHz ◄► 130MHz ◄►3

	FIRST TUNING BAND	SECOND TUNING BAND
VHF	02~06	07~13
UHF		
CABLE	01~06,14,15,95~99	07~13,16~46

NOTE: CABLE channel numbers as recommended by th
Committee and published as EIA INTERIM S
TELEVISION CHANNEL IDENTIFICATION PLA



Tuner Voltage Chart

tage test points are located and designated on the circuit side of A–Board.
BP 5V BM 12V AGC 7.5V
, and Clock have no DC readings. They are digital signals from the MPU.
ge at the 30V test pin varies with channel selection. Please refer to correct
depending on TV/CATV(CABLE) switch position.

sition

H	VOLT	CH	VOLT
25	10.7	48	16.4
26	11.0	49	16.7
27	11.3	50	16.9
28	11.5	51	17.2
29	11.8	52	17.5
30	12.0	53	17.8
31	12.3	54	18.1
32	12.5	55	18.4
33	12.8	56	18.7
34	13.0	57	19.1
35	13.3	58	19.4
36	13.5	59	19.8
37	13.7	60	20.2
38	14.0	61	20.6
39	14.2	62	21.0
40	14.5	63	21.5
41	14.7	64	21.9
42	14.9	65	22.4
43	15.2	66	22.9
44	15.4	67	23.5
45	15.7	68	24.1
46	15.9	69	24.7
47	16.2		

Cable Position

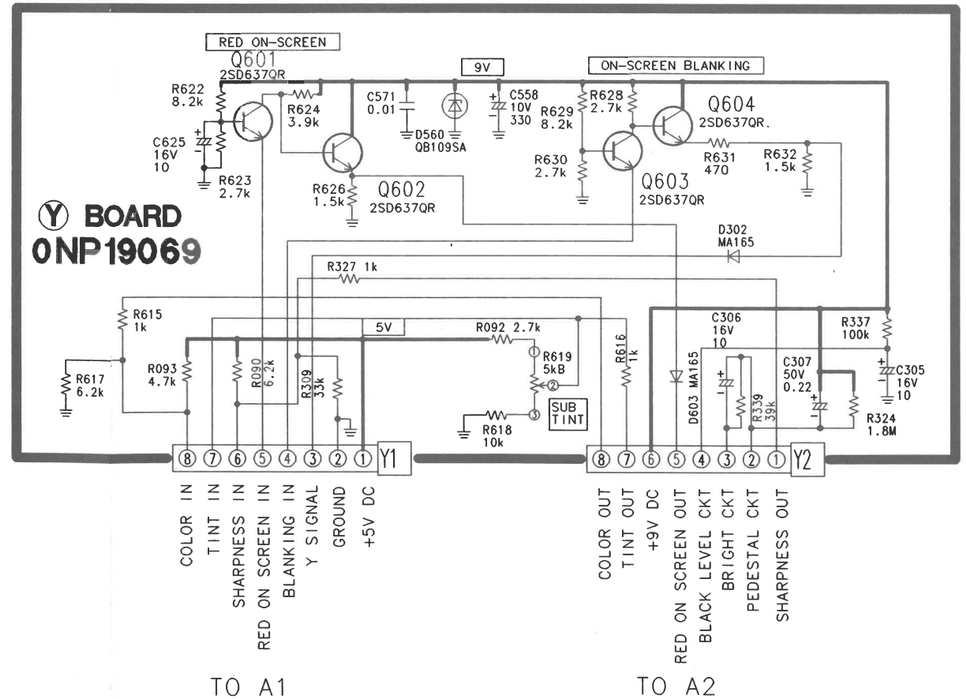
	CH	VOLT	CH	VOLT	CH	VOLT	CH	VOLT
CABLE	01	6.7	26	12.2	51	4.2	76	10.6
	02	3.8	27	12.7	52	4.4	77	10.9
	03	4.7	28	13.1	53	4.7	78	11.2
	04	5.7	29	13.5	54	4.9	79	11.4
	05	7.8	30	14.0	55	5.1	80	11.7
	06	9.1	31	14.5	56	5.3	81	11.8
	07	7.3	32	14.9	57	5.6	82	12.2
	08	7.9	33	15.5	58	5.8	83	12.4
	09	8.4	34	16.0	59	6.1	84	12.7
	10	9.0	35	16.5	60	6.3	85	12.9
	11	9.5	36	17.1	61	6.6	86	13.2
	12	10.0	37	17.7	62	6.8	87	13.4
	13	10.4	38	18.3	63	7.1	88	13.7
	14	18.2	39	19.1	64	7.4	89	13.9
	15	22.0	40	19.8	65	7.6	90	14.1
	16	3.9	41	20.6	66	7.9	91	14.4
	17	4.3	42	21.5	67	8.2	92	14.6
	18	4.7	43	22.5	68	8.5	93	14.9
	19	5.2	44	23.7	69	8.7	94	15.1
	20	5.6	45	24.9	70	9.0	95	10.2
	21	6.3	46	26.3	71	9.3	96	12.0
	22	6.8	47	3.5	72	9.5	97	13.4
	23	10.9	48	3.7	73	9.8	98	14.8
	24	11.3	49	3.9	74	10.1	99	16.5
	25	11.8	50	4.1	75	10.4		

MICROPROCESSOR PROGRAMMING FOR BAND TUNING/SWITCHING

54MHz ⟷ 130MHz ⟷ 360MHz ⟷ 806MHz

	FIRST TUNING BAND	SECOND TUNING BAND	THIRD TUNING BAND
VHF	02~06	07~13	
UHF			14~69
CABLE	01~06,14,15,95~99	07~13,16~46	47~94

NOTE: CABLE channel numbers as recommended by the joint EIA/NCTA Engineering Committee and published as EIA INTERIM STANDARD NO. 6 – CABLE TELEVISION CHANNEL IDENTIFICATION PLAN – MAY 1983.



REPLACEMENT PARTS LIST

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Ref. No.	Part No.	Description
D302	MA165	DIODE
D451	ERA15-01	DIODE
D452	MA165	DIODE
D453	MA165	DIODE
D456	MA4120M	DIODE
D457	MA4110	DIODE, ZENER
D502	MA4082	DIODE
D503	MA165	DIODE
D506	MA4062	DIODE
D531	**AS01**	**DIODE**
D532	MA4110	DIODE, ZENER
D533	**TVSQA208G**	**DIODE, ZENER**
D541	MA4051M	DIODE, ZENER
D551	**RU2N**	**DIODE**
D552	**AS01**	**DIODE**
D553	**AS01**	**DIODE**
D554	**AS01**	**DIODE**
D555	MA165	DIODE
D556	MA1360H	DIODE, ZENER
D557	TVSQB105N	DIODE, ZENER
D560	TVSQB109SA	DIODE, ZENER
D603	MA165	DIODE
D801	**EM02BM**	**DIODE**
D802	**EM02BM**	**DIODE**
D803	**EM02BM**	**DIODE**
D804	**EM02BM**	**DIODE**
D806	**0RPF5B0M080N**	**THERMISTOR**
		FUSES
F001	**0BA1C40NU100**	**FUSE 4.0A/125V**
		INTEGRATED CIRCUITS
IC001	MN15151Q14R	INT CKT
IC101	**AN5160NK-N**	**INT CKT**
IC201	AN5265	INT CKT
IC451	LA7835-TV	INT CKT
IC551	**AN78M12**	**PLUS 12V AVR**
IC801	**TVSSTR30130**	**INT CKT**
IC1101	TNQ2682B	RECEIVER, REMOTE CONTROL
		COILS
L006	TLUABTA5R6K	COIL, PEAKING 5.6UH
L007	TLUABTA5R6K	COIL, PEAKING 5.6UH
L008	TLUABTA5R6K	COIL, PEAKING 5.6UH
L010	EXCELSA24	FERRITE BEAD
L011	TLUABTA1R0K	COIL, PEAKING 1.0UH
L103	TLI67394-1	COIL, AFT
L104	TLQ012K205C	COIL, PEAKING 1.2UH
L105	TLI158755	COIL, VCO
L106	TLUABTA150K	COIL, PEAKING 15UH
L108	TLQ012K205C	COIL, PEAKING 1.2UH
L109	EXCELSA35	FERRITE BEAD
L201	TLS63318-2	COIL, QUADRATURE
L301	ELB5A082	3.58MHZ TRAP
L354	TLUABTA151K	COIL, PEAKING 150UH
L556	**EXCELSA24**	**FERRITE BEAD**
L561	**EXCELSA24**	**FERRITE BEAD**
L570	**0LY15306F**	**YOKE, DEFLECTION**
L601	TLUABTA100K	COIL, PEAKING 10UH
L801	**ELF18D217**	**CHOKE, AC LINE**
L804	**0LK19030M**	**COIL, DEGAUSSING**
		TRANSISTORS
Q001	2SC1685QR	TRANSISTOR
Q004	2SC1685QR	TRANSISTOR
Q005	2SA564AQR	TRANSISTOR
Q006	2SC1685QR	TRANSISTOR
Q007	2SC1685QR	TRANSISTOR
Q015	2SA564AQR	TRANSISTOR
Q019	2SC1685QR	TRANSISTOR
Q102	2SC1685QR	TRANSISTOR
Q301	2SC1685QR	TRANSISTOR
Q303	2SA719QR	TRANSISTOR
Q316	2SC1685QR	TRANSISTOR
Q351	2SC1573NC	TRANSISTOR
Q352	2SC1573NC	TRANSISTOR
Q353	2SC1573NC	TRANSISTOR
Q451	2SC1685QR	TRANSISTOR
Q501	**2SC1573AH**	**TRANSISTOR**
Q533	**2SC1685QR**	**TRANSISTOR**
Q541	2SC1685QR	TRANSISTOR
Q551	2SD1439P	TRANSISTOR
Q601	2SD637QR	TRANSISTOR
Q602	2SD637QR	TRANSISTOR
Q603	2SD637QR	TRANSISTOR
Q604	2SD637QR	TRANSISTOR
		RELAYS
RL001	**TSE1864**	**RELAY**
		RESISTORS
R001	ERDS2TJ132	RES,C 1.3K-J-1/4
R008	ERDS2TJ182	RES,C 1.8K-J-1/4
R009	ERDS2TJ182	RES,C 1.8K-J-1/4
R013	ERDS2TJ473	RES,C 47K-J-1/4
R016	ERDS2TJ222	RES,C 2.2K-J-1/4
R020	ERDS2TJ392	RES,C 3.9K-J-1/4
R021	ERDS2TJ682	RES,C 6.8K-J-1/4
R022	ERDS2TJ223	RES,C 22K-J-1/4
R023	ERDS2TJ392	RES,C 3.9K-J-1/4
R024	ERDS2TJ134	RES,C 130K-J-1/4
R025	ERDS2TJ331	RES,C 330-J-1/4
R028	ERDS2TJ680	RES,C 68-J-1/4
R030	ERDS2TJ823	RES,C 82K-J-1/4
R031	ERDS2TJ823	RES,C 82K-J-1/4
R035	ERDS2TJ331	RES,C 330-J-1/4
R037	ERDS2TJ562	RES,C 5.6K-J-1/4
R045	ERDS2TJ822	RES,C 8.2K-J-1/4
R049	ERD25TJ223	RES,C 22K-J-1/4
R050	ER0S2CKF1002	RES,M 10K-F-1/4
R051	ER0S2CKF1002	RES,M 10K-F-1/4
R055	ERDS1FJ470	RES,C 47-J-1/2
R056	ERDS2TJ562	RES,C 5.6K-J-1/4
R058	ERDS2TJ222	RES,C 2.2K-J-1/4
R059	ERDS2TJ222	RES,C 2.2K-J-1/4
R060	ERDS2TJ332	RES,C 3.3K-J-1/4
R061	ERDS2TJ512	RES,C 5.1K-J-1/4
R065	ERDS2TJ432	RES,C 4.3K-J-1/4
R071	ERDS2TJ182	RES,C 1.8K-J-1/4
R072	ERDS2TJ473	RES,C 47K-J-1/4
R074	ERG1SJ683	RES,M 68K-J-1W
R075	ERDS2TJ103	RES,C 10K-J-1/4
R078	ERDS2TJ101	RES,C 100-J-1/4
R079	ERDS2TJ561	RES,C 560-J-1/4
R080	ERDS2TJ391	RES,C 390-J-1/4
R081	ERDS2TJ122	RES,C 1.2K-J-1/4
R083	ERDS2TJ103	RES,C 10K-J-1/4
R085	ERD25TJ393	RES,C 39K-J-1/4
R086	ERDS2TJ473	RES,C 47K-J-1/4
R087	ERDS2TJ472	RES,C 4.7K-J-1/4
R088	ERDS2TJ183	RES,C 18K-J-1/4
R090	ERDS2TJ622	RES,C 6.2K-J-1/4
R092	ERDS2TJ272	RES,C 2.7K-J-1/4
R093	ERDS2TJ472	RES,C 4.7K-J-1/4
R094	ERDS2TJ562	RES,C 5.6K-J-1/4
R095	ERDS2TJ101	RES,C 100-J-1/4
R096	ERDS2TJ101	RES,C 100-J-1/4
R097	ERD25TJ101	RES,C 100-J-1/4
R106	EVN60AA00B53	CONTROL 5K
R107	ERDS2TJ561	RES,C 560-J-1/4

REPLACEMENT PARTS LIST

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Ref. No.	Part No.	Description
R108	ERDS2TJ222	RES,C 2.2K–J–1/4
R109	ERDS2TJ221	RES,C 220–J–1/4
R110	ERDS2TJ822	RES,C 8.2K–J–1/4
R111	ERDS2TJ223	RES,C 22K–J–1/4
R112	ERDS2TJ121	RES,C 120–J–1/4
R151	ERDS2TJ274	RES,C 270K–J–1/4
R152	ERDS2TJ104	RES,C 100K–J–1/4
R153	ERDS2TJ472	RES,C 4.7K–J–1/4
R201	ERD25TJ102	RES,C 1K–J–1/4
R202	ERDS2TJ823	RES,C 82K–J–1/4
R203	ERDS2TJ471	RES,C 470–J–1/4
R205	ERDS2TJ681	RES,C 680–J–1/4
R206	ERQ1CJP220	RES,F 22–J–1W
R207	ERD25FJ4R7	RES,C 4.7–J–1/4
R209	ERDS2TJ821	RES,C 820–J–1/4
R210	ERDS2TJ682	RES,C 6.8K–J–1/4
R211	ERDS2TJ222	RES,C 2.2K–J–1/4
R212	ERDS2TJ332	RES,C 3.3K–J–1/4
R213	ERDS2TJ102	RES,C 1K–J–1/4
R214	ERDS2TJ103	RES,C 10K–J–1/4
R251	ERDS2TJ620	RES,C 47–J–1/4W
R301	ERDS2TJ471	RES,C 470–J–1/4
R303	ERDS2TJ182	RES,C 1.8K–J–1/4
R304	EVND4AA00B23	CONTROL 2K
R305	ERDS2TJ183	RES,C 18K–J–1/4
R308	ERDS2TJ753	RES,C 75K–J–1/4
R309	ERDS2TJ333	RES,C 33K–J–1/4
R310	ERDS2TJ472	RES,C 4.7K–J–1/4
R311	ERDS2TJ151	RES,C 150–J–1/4
R314	ERDS2TJ561	RES,C 560–J–1/4
R316	ERDS2TJ272	RES,C 2.7K–J–1/4
R317	ERDS2TJ223	RES,C 22K–J–1/4
R318	EVN60AA00B14	CONTROL 10K
R320	ERD25TJ103	RES,C 10K–J–1/4
R323	ERDS2TJ393	RES,C 39K–J–1/4
R324	ERDS2TJ185	RES,C 1.8MEG–J–1/4
R326	ERD25TJ562	RES,C 5.6K–J–1/4
R327	ERDS2TJ102	RES,C 1K–J–1/4
R334	ERDS2TJ102	RES,C 1K–J–1/4
R336	ERDS2TJ222	RES,C 2.2K–J–1/4
R337	ERDS2TJ104	RES,C 100K–J–1/4
R339	ERDS2TJ393	RES,C 39K–J–1/4
R351	ERG1SJ153	RES,M 15K–J–1W
R352	ERG1SJ153	RES,M 15K–J–1W
R354	EVN49AA00B33	CONTROL 3K
R355	EVN49AA00B33	CONTROL 3K
R357	EVN49AA00B32	CONTROL 300 OHM
R358	EVN49AA00B32	CONTROL 300 OHM
R360	ERDS2TJ181	RES,C 180–J–1/4
R361	ERDS2TJ102	RES,C 1K–J–1/4
R363	ERDS2TJ331	RES,C 330–J–1/4
R367	ERDS2TJ221	RES,C 220–J–1/4
R368	ERDS2TJ102	RES,C 1K–J–1/4
R370	ERDS2TJ184	RES,C 180K–J–1/4
R371	ERDS2TJ223	RES,C 22K–J–1/4
R374	ERDS1TJ272	RES,C 2.7K–J–1/2
R375	ERDS1TJ272	RES,C 2.7K–J–1/2
R379	ERDS1TJ272	RES,C 2.7K–J–1/2
R380	ERDS2TJ182	RES,C 1.8K–J–1/4
R381	ERG1SJ153	RES,M 15K–J–1W
R401	ERDS2TJ684	RES,C 680K–J–1/4
R402	ERDS2TJ681	RES,C 680–J–1/4
R403	ERDS2TJ271	RES,C 270–J–1/4
R451	ERD25TJ821	RES,C 820–J–1/4
R452	ERDS2TJ393	RES,C 39K–J–1/4
R453	EVN60AA00B54	CONTROL 50K
R454	ERDS1FJ1R8	RES,C 1.8–J–1/2
R455	ERDS2TJ223	RES,C 22K–J–1/4
R456	ERDS2TJ682	RES,C 6.8K–J–1/4
R457	ERDS2TJ222	RES,C 2.2K–J–1/4
R458	ERDS2TJ223	RES,C 22K–J–1/4
R461	ERDS2TJ103	RES,C 10K–J–1/4
R462	ERDS2TJ103	RES,C 10K–J–1/4
R463	ERDS2TJ104	RES,C 100K–J–1/4

Ref. No.	Part No.	Description
R464	ERDS2TJ223	RES,C 22K–J–1/4
R465	ERD25TJ222	RES,C 2.2K–J–1/4
R466	ERDS2TJ163	RES,C 16K–J–1/4
R471	ERDS2TJ153	RES,C 15K–J–1/4
R501	ERDS2TJ272	RES,C 2.7K–J–1/4
R502	ERDS2TJ222	RES,C 2.2K–J–1/4
R503	ERDS2TJ392	RES,C 3.9K–J–1/4
R505	ERDS2TJ821	RES,C 820–J–1/4
R506	ERDS2TJ472	RES,C 4.7K–J–1/4
R508	ERDS2TJ222	RES,C 2.2K–J–1/4
R509	**ERG2SJS562**	**RES,M 5.6K–J–2W**
R510	**ERG2ANJ332**	**RES,M 3.3K–J–2W**
R512	ERD25TJ332	RES,C 3.3K–J–1/4
R515	ERDS2TJ271	RES,C 270–J–1/4
R516	ERDS2TJ391	RES,C 390–J–1/4
R524	ERDS2TJ820	RES,C 82–J–1/4
R531	**ERD25FJ470**	**RES,C 47–J–1/4**
R532	**ER0S2CKF6341**	**RES,M 6.34K–F–1/4**
R533	**ER0S2CKF4641**	**RES,M 4.64K–F–1/4**
R534	**ERDS2TJ103**	**RES,C 10K–J–1/4**
R541	ERD25TJ101	RES,C 100–J–1/4
R542	ERDS2TJ103	RES,C 10K–J–1/4
R544	ERDS2TJ223	RES,C 22K–J–1/4
R545	ERDS2TJ332	RES,C 3.3K–J–1/4
R547	ERDS2TJ103	RES,C 10K–J–1/4
R551	ERDS1FJ1R0	RES,C 1.0–J–1/2
R552	ERDS1FJ1R0	RES,C 1.0–J–1/2
R553	ERDS1FJ1R0	RES,C 1.0–J–1/2
R554	ERDS2TJ334	RES,C 330K–J–1/4
R556	ERD25TJ103	RES,C 10K–J–1/4
R557	ERDS2TJ103	RES,C 10K–J–1/4
R558	**ERQ1CJP2R0**	**RES,F 2.0–J–1W**
R559	ERG3ANJ101	RES,M 100–J–3W
R560	ERG2ANJ101	RES,M 100–J–2W
R562	**ERG1SJ122**	**RES,M 1.2K–J–1W**
R569	**ERDS1FJ101**	**RES,C 100–J–1/2**
R570	ERDS2TJ222	RES,C 2.2K–J–1/4
R601	ERD25TJ331	RES,C 330–J–1/4
R604	ERDS2TJ224	RES,C 220K–J–1/4
R609	ERDS2TJ271	RES,C 270–J–1/4
R610	ERDS2TJ271	RES,C 270–J–1/4
R611	ERDS2TJ271	RES,C 270–J–1/4
R615	ERDS2TJ102	RES,C 1K–J–1/4
R616	ERDS2TJ102	RES,C 1K–J–1/4
R617	ERDS2TJ622	RES,C 6.2K–J–1/4
R618	ERDS2TJ103	RES,C 10K–J–1/4
R619	EVN60AA00B53	CONTROL 5K
R620	ERDS2TJ102	RES,C 1K–J–1/4
R621	ERD25TJ822	RES,C 8.2K–J–1/4
R622	ERDS2TJ822	RES,C 8.2K–J–1/4
R623	ERDS2TJ272	RES,C 2.7K–J–1/4
R624	ERDS2TJ392	RES,C 3.9K–J–1/4
R626	ERDS2TJ152	RES,C 1.5K–J–1/4
R628	ERDS2TJ272	RES,C 2.7K–J–1/4
R629	ERDS2TJ822	RES,C 8.2K–J–1/4
R630	ERDS2TJ272	RES,C 2.7K–J–1/4
R631	ERDS2TJ471	RES,C 470–J–1/4
R632	ERDS2TJ152	RES,C 1.5K–J–1/4
R801	**ERF3AK5R6**	**RES,W 5.6–K–3W**
R802	**ERF10ZJ221**	**RES,W 220–J–10W**
R804	**ERDS2TJ224**	**RES,C 220K–J–1/4**
R805	**ERDS1TJ103**	**RES,C 10K–J–1/2**
R807	**ERD25FJ470**	**RES,C 47–J–1/4**
R808	**ERD25FJ330**	**RES,C 33–J–1/4**
R810	**ERF3AJ180**	**RES,W 18–J–3W**
R815	**ERC12ZGM825**	**RES,S 8.2MEG–M–1/2**
R1101	ERDS2TJ474	RES,C 470K–J–1/4
		SWITCHES
S001	EVQQBH12T	SWITCH, PUSH
S002	EVQQBH12T	SWITCH, PUSH
S003	EVQQBH12T	SWITCH, PUSH

REPLACEMENT PARTS LIST

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Ref. No.	Part No.	Description
S004	EVQQBH12T	SWITCH, PUSH
S005	EVQQBH12T	SWITCH, PUSH
S010	EVQQBH12T	SWITCH, PUSH
		TRANSFORMERS
T001	**TLP16297**	**TRANSFORMER, POWER SUPPLY**
T501	**TLH15412**	**TRANSFORMER, HORIZONTAL DRIVER**
T502	**ETE19Z30AY**	**TRANSFORMER, HORIZONTAL COUPLING**
T551	**0LF04701F**	**TRANSFORMER, FLYBACK**
		CRYSTALS/FILTERS
X001	TSS2077MX	CRYSTAL, OSCILLATOR
X101	EFCH45MVK12N	SAW FILTER
X102	EFCS4R5MW3BA	4.5MHZ TRAP
X201	EFCS4R5MS4	FILTER 4.5MHZ BANDPASS
X501	EF0A503KS41	CRYSTAL, OSCILLATOR
X601	TSS816MX	CRYSTAL 3.58MHZ OSCILLATOR
		OTHERS
M001	**A26JGZ91X**	**CRT 10"**
M002	EAS7D11KC–G	SPEAKER, 2–3/4" X 1–1/2" 16 OHM
M003	ENV568C4G3	U/V TUNER CT–10R11S TP1016K
M004	ENV568C5G3	U/V TUNER CT–10R11CS
M005	EUR641231	TRANSMITTER, REMOTE CONTROL CT–10R11CS CT–10R11S
M006	EUR641232	TRANSMITTER, REMOTE CONTROL TP1016K
M007	**TJS1A5150**	**CRT SOCKET**
M008	TQB2A0817	MANUAL, OWNERS' CT–10R11CS CT–10R11S
M009	TQB2A0819	MANUAL, OWNERS' TP1016K
M010	TQB2A0820	MANUAL, OWNERS': FRENCH CT–10R11CS
M011	TXFBL011SER	ASSY. SWIVEL MOUNTING BRACKET
M012	TXFBX021SER	ASSY. 7 PUSHBUTTON CT–10R11CS CT–10R11S
M013	TXFBX041SER	ASSY. 7 PUSHBUTTON TP1016K
M014	TXFKU1693SER	ASSY. CABINET BACK CT–10R11S
M015	TXFKU1793SER	ASSY. CABINET BACK TP1016K
M016	TXFKU510SER	ASSY. CABINET BACK CT–10R11CS
M017	TXFKY890SER	ASSY. CABINET FRONT CT–10R11S CT–10R11CS
M018	TXFKY930SER	ASSY. CABINET FRONT TP1916K
M019	TXF3A011AJ1	ASSY. DAG GROUND
M020	T8A262	SILICONE GREASE–HEAT SINK COMPOUND
M021	UR64EC978A	BATTERY COVER: TRANSMITTER
J1	XCJT1A7010	JACK, EARPHONE
M022	0SA100004	ANTENNA, VHF
M023	**0SX110903**	**LINE CORD**

Ref. No.	Part No.	Description

ABBREVIATION OF PART NAME AND DESCRIPTION

RESISTOR

PART NAME & DESCRIPTION			
TYPE		ALLOWANCE	
C	Carbon	F	+/– 1%
F	Fuse	J	+/– 5%
M	Metal Oxide	K	+/– 10%
S	Solid	M	+/– 20%
W	Wire Wound	G	+/– 2%

Part No. **Description**

Example: ERD25TJ104 (C) 100KΩ (J) 1/4W

CAPACITOR

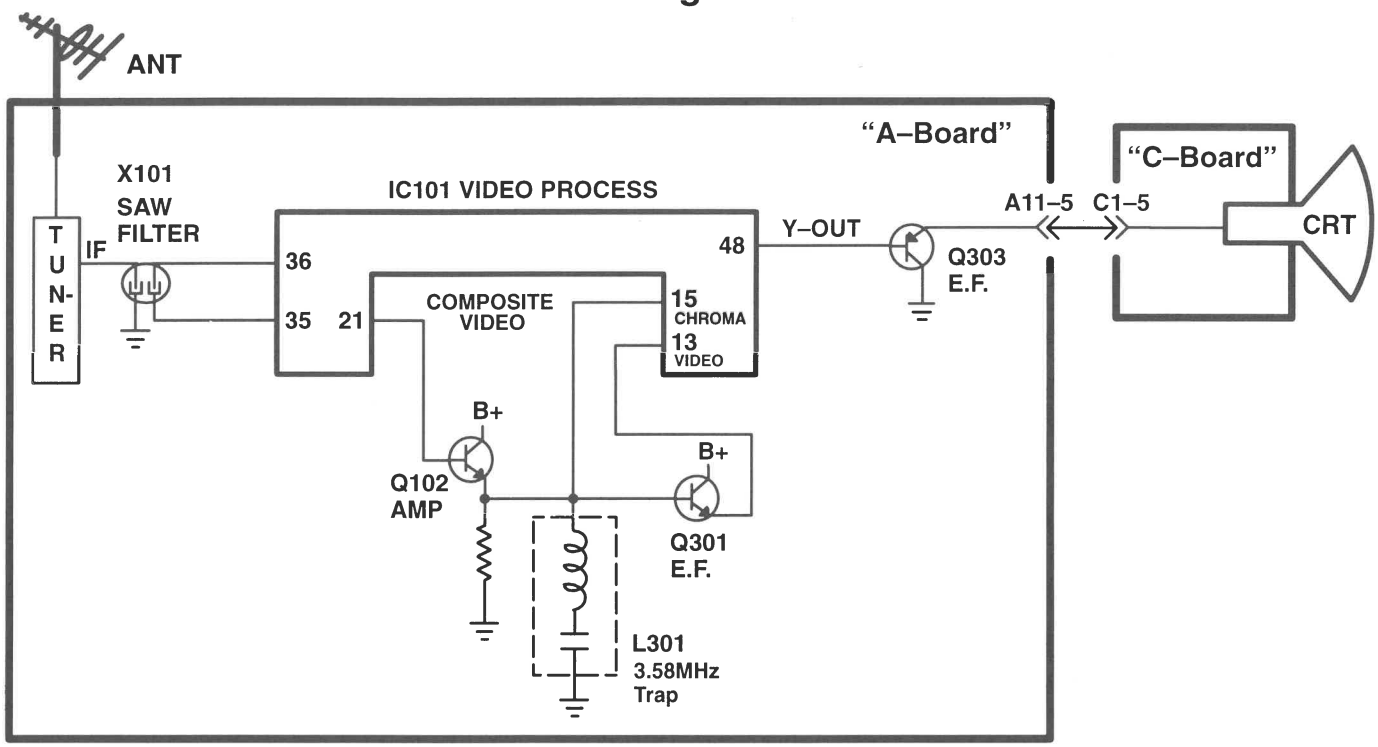
PART NAME & DESCRIPTION			
TYPE		ALLOWANCE	
C	Ceramic	C	+/– 0.25pF
E	Electrolytic	D	+/– 0.5pF
P	Polyester	F	+/– 1pF
S	Styrol	J	+/– 5%
T	Tantalum	K	+/– 10%
		L	+/– 15%
		M	+/– 20%
		P	+100% –0%
		Z	+80% –20%

Part No. **Description**

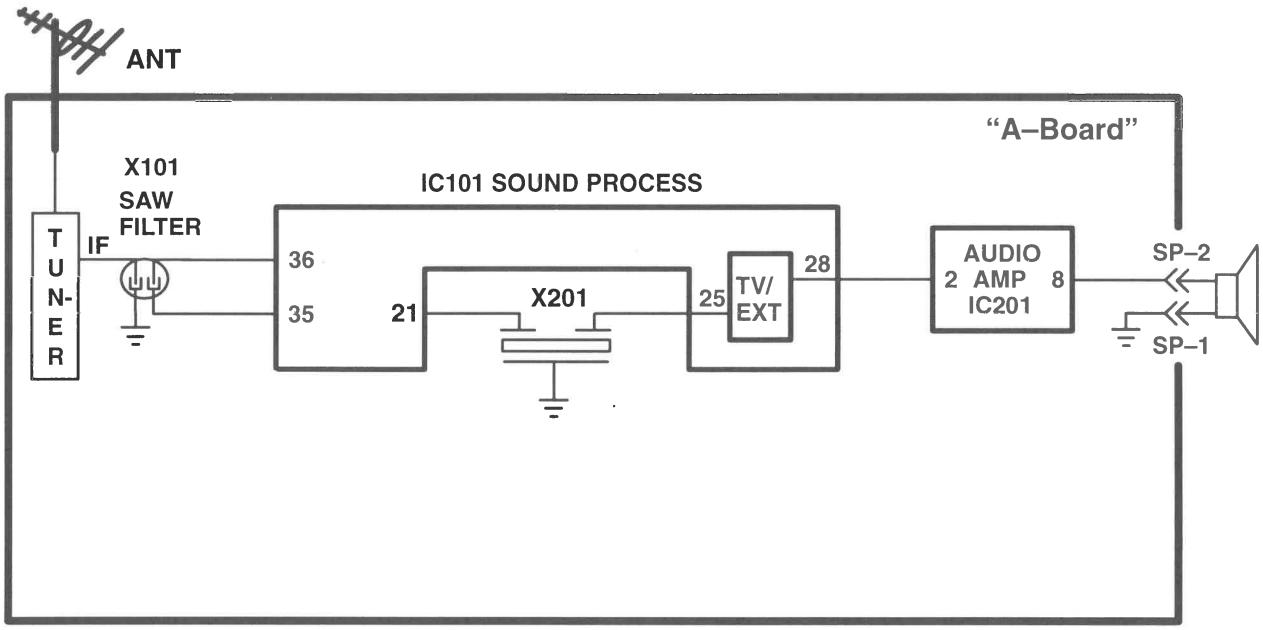
Example: ECKF1H103ZF (C) 0.01µF (Z) 50V

Block Diagrams (CT–10R11S/CS & TP1016K)

Video Signal Path



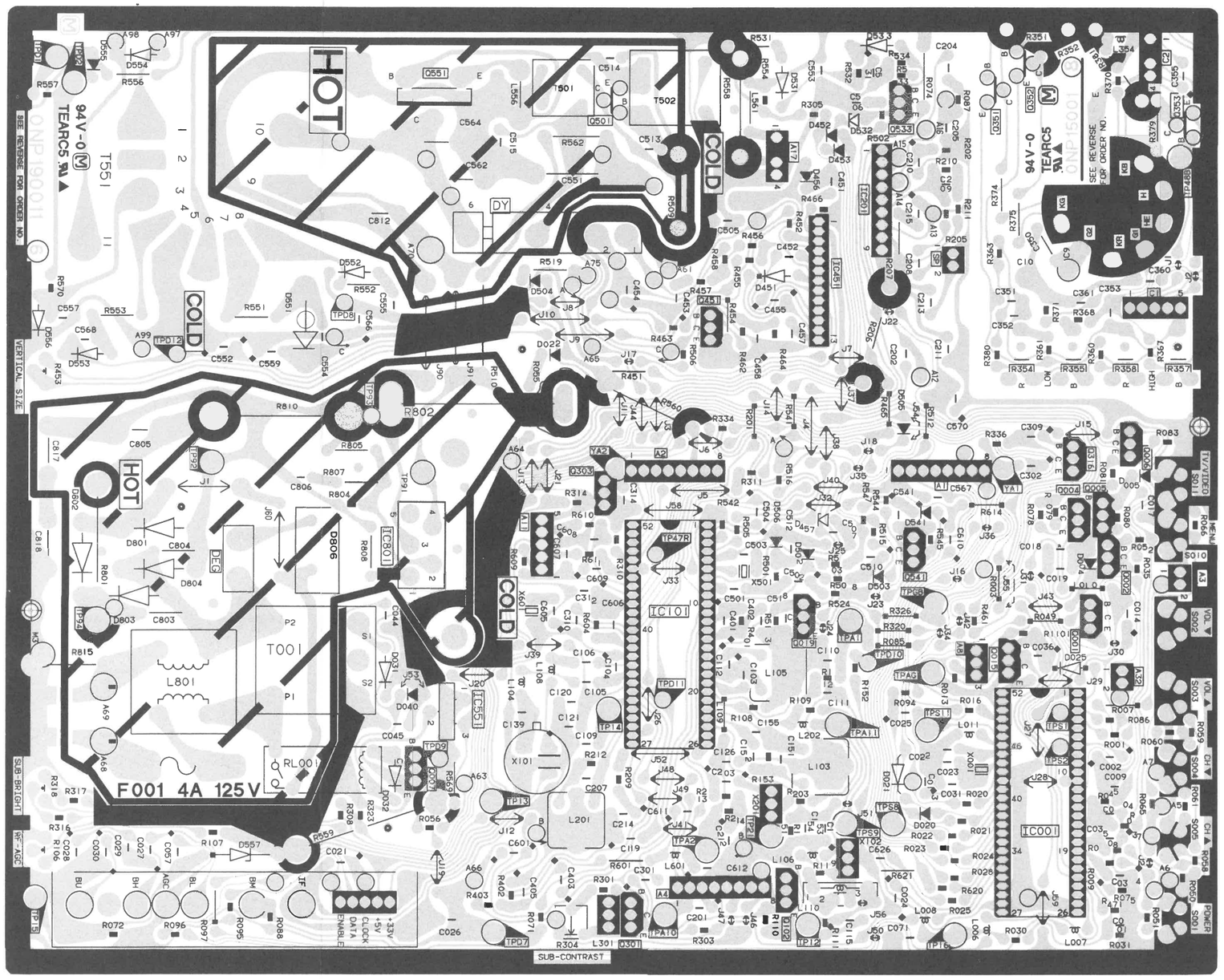
Audio Signal Path



Notes:

A–Board ONP190011

C–Board ONP15001



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